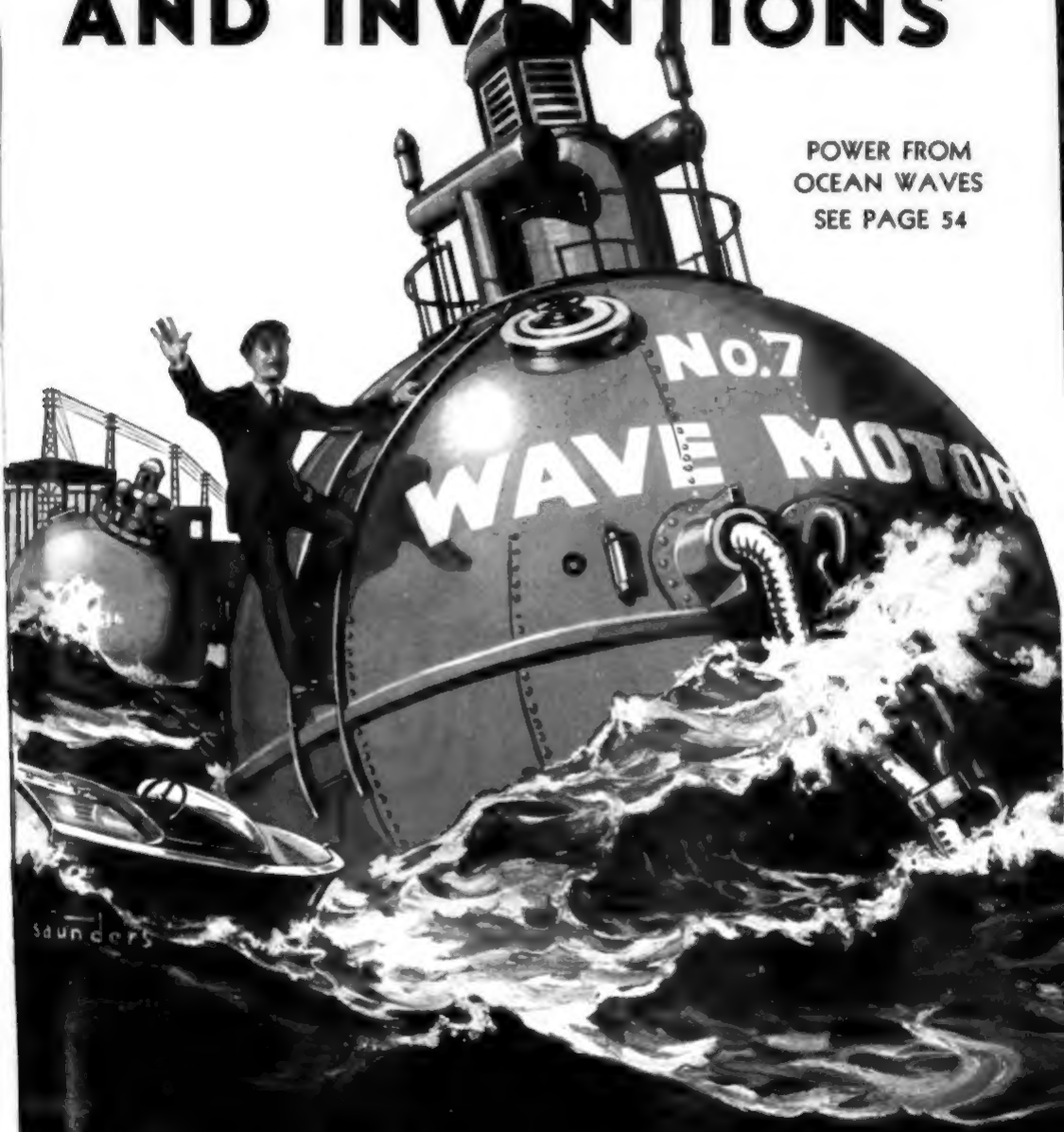
PUBLICATION

MODERN MECHANIX AND INVENTIONS

AUG. 25c

POWER FROM OCEAN WAVES
SEE PAGE 54



Mechanical Treasure Hunting

A FAWCETT PUBLICATION
This magazine and its brother publication, Mechanical Package Magazine, are not connected with or associated with any other magazine of a scientific or mechanical nature.

MODERN MECHANIX AND INVENTIONS

Other FAWCETT Magazines: Mechanical Package Magazine, Screen Play, Triple-X Western, Battle Stories, Hollywood, Screen Book, and Amateur Golfer and Sportsman.

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NUMBER 4

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To the man who is worried about this Depression

THIS isn't the time to waste words or to ignore facts. This depression has already put many men out of work, and threatens the earning power of others who still draw pay. It's useless to shut our eyes to it, so why try?

On the contrary, let's face the facts, calmly and without fear. Let's analyze the situation, as man to man, and find out what *you* can do to escape the depression, and perhaps *even take advantage of it.*

In the first place, even when prosperity returns, many of the now unemployed will not be much better off. It's not the business depression that is beating them—they are working under a depression ALL their lives. For they are trying to wrest a living from a world that asks more than they have to offer.

What business wants today—*and will pay any price to get*—is RESULTS! And if a man can't deliver—well, it's only a question of time before he is replaced by a man who can.

But if you can accept the challenge—if you are prepared to deliver results, this depression can be a blessing in disguise—an opportunity to climb the ladder, with the way all cleared for you. Never has business been searching more eagerly for ability, knowledge and training.

Maybe it does not appear that way to you, right now. But look around and you will see it. You will see that in this crisis the trained man has suffered far less than others. Indeed, in many cases, he has forged ahead, has even won raises and promotions and is all set for the tremendous opportunities that will inevitably come with returning good times.

But let's get down to cases—letters received during the last few months—so that you may see exactly what we mean—

These Men Are Beating the Depression

J. H. W., Michigan, writes, "I have been promoted—just one week after my superintendent learned I was taking LaSalle training in my spare time. He made a chance for me by letting out a man who was not accurate in his work."

R. P. F., Illinois, "Thanks to my training with you, I have been advanced to head of the bookkeeping department. Please recommend one of your students to fill my old job."

F. A., Ontario, "About three weeks ago, our superintendent told me the company had a letter from LaSalle about my training. He then told me that the manager had been looking for a man to fill a vacancy and your letter had won the place for me."

E. S., Ohio, "The fact that I have increased my salary and have been promoted to the managership in the face of the depression is, I think, ample proof of the value of my LaSalle training."

J. L., California, "I have just been promoted to Assistant Traffic Manager (thanks to LaSalle). An increase in salary came with the promotion. I consider this pretty good during this period of wage cutting and economy."

What About You?

But enough of talking about others. You are interested, after all, in knowing whether *you* can beat the depression.

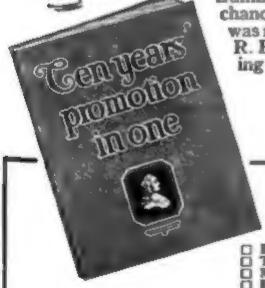
It depends on the kind of man you are. Many men prefer to take a licking in silence. They are *waiting* for the return of prosperity. Then, so they think, they will make up the ground they lost.

If you belong to this class of "waiters," this message will not interest you. Conditions will improve, and those content to ride up and down on the business wave will enjoy another temporary period of lessened apprehension and trouble.

But if you belong to the other class—if you are in earnest about winning back whatever reduction in income you have suffered and moving up into the higher salary brackets, if you are determined to get ready for the big jobs that will be *seeking* men, then this is *your day of opportunity.* Not tomorrow—not when business picks up—but *now.*

Times like these call for *action.* Sooner or later prosperity will return. Will you be ready for leadership—or will you be sorry for the "break" you passed up in 1932?

Why risk your future for want of a minute's time? At least find out what LaSalle training offers you. Just fill out and mail the coupon now—one minute will do it.



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LA SALLE EXTENSION UNIVERSITY Dept. 8493-R CHICAGO, ILL.

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☐ Traffic Management	☐ Expert Bookkeeping	☐ Commercial Law
☐ Modern Salesmanship	☐ Railway Accounting	☐ Office Management
☐ Paper Salesman's Training	☐ Effective Speaking	☐ Chain Grocery Management
☐ Railway Station Mgmt.	☐ Business Correspondence	☐ Business English
☐ Industrial Management	☐ Personnel Management	☐ Foremanship

Name ..... Address ..... Present Position .....

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Plane Talk Editor
Pilot Gene Shank
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S. S. Rabl
Seaplane Designer and Naval Architect

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Listed here are the members of the Modern Mechanix Board of Editors, all qualified by national repute to serve as authorities. They will gladly answer questions from readers if stamped envelope is sent. Address them in care of this magazine, 529 S. 7th St., Minneapolis, Minn.

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OPPORTUNITIES *are many* for the Radio Trained Man

Don't spend your life slaving away in some dull, hopeless job! Don't be satisfied to work for a mere $20 or $30 a week. Let me show you how to get your start in Radio—the fastest-growing, biggest money-making game on earth.

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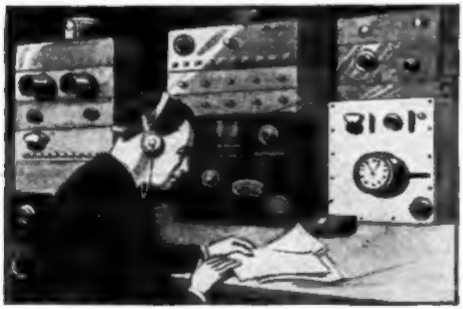
Talking Picture and Public Address Systems offer opportunities to the Trained Radio Man. Here is a great new Radio field just beginning to grow! Prepare NOW for these wonderful opportunities! Learn Radio Sound Work at COYNE on actual TALKING PICTURE and SOUND REPRODUCTION equipment.



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We are looking for more ambitious young fellows with factory, building construction, or other mechanical experience to prepare for well-paid positions in Drafting. Such men, we find, are unusually successful as Draftsmen, because they know how things are done, and that's a priceless asset to the man who makes the blue-print plans. Get in touch with us and we'll tell you how you can cash in on your entire past experience.

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You know enough about blueprints to understand that PLANS govern every move in factory and construction jobs. The Draftsman who makes them is several jumps ahead of the workman who follows them. And so we want you to know that DRAFTING is a logical, natural PROMOTION from mechanical and building work—better-paid, more interesting—just the kind of work you'd enjoy doing.

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Please tell me, without cost or obligation, about your training in line marked X below:

☐ **DRAFTING** (Send free test lesson)

☐ Architecture	☐ Accounting	☐ Auto Engineering
☐ Contracting and Building	☐ Civil Service Position	☐ Highway Engineering
☐ Electrical Engineering	☐ Law	☐ Mechanical Engineering
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I will train you at home to fill a BIG PAY Radio Job!

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With the aid of this equipment you can work out with your own hands many of the things you read in our text books. From it you get the valuable experience that tells an expert from a beginner. In a short time you have learned what it would take years to learn in the field. It's training like this that puts the extra dollars in your pay envelope. Some of the many circuits you build and experiments you perform are: Measuring the merit of a tube, building an ohmmeter, tube voltmeter, and a Grid dip meter for service work. You actually make experiments illustrating the important principles in the 25 best known sets.

Apparatus for transmission and reception of an actual radio signal—one of the many experiments set up with my outfits.

Here's Proof

$100 a week

"My earnings in Radio are many times greater than I ever expected they would be when I enrolled. They seldom fall under $100 a week."
E. E. WINBORNE
1267 W. 48th St.,
Norfolk, Va.

Jumped from $35 to $100 a week

"Before I entered Radio I was making $35 a week. Last week I earned $110 servicing and selling Radios. I owe my success to N. R. I."
J. A. VAUGHN
Grand Radio & Appliance Co., 3107 S. Grand Blvd., St. Louis, Mo.

$500 extra in 6 months

"I find I made $500 from January to May in my spare time. My best week brought me $107. I should have taken it long ago."
HOYT MOORE
R. R. 3, Box 919,
Indianapolis, Ind.

If you are dissatisfied with your present job, if you are struggling along in a rut with little or no prospect of anything better than a skinny pay envelope—clip the coupon NOW. Get my big FREE book on the opportunities in *Radio*. Read how quickly you can learn at home in your spare time to be a Radio Expert—what good jobs my graduates have been getting—real jobs with real futures.

Free Book Tells How Mail Coupon!

Many Radio Experts Make $50 to $100 a Week

In about ten years the Radio Industry has grown from $2,000,000 to hundreds of millions of dollars. Over 300,000 jobs have been created by this growth, and thousands more will be created by its continued development. Many men and young men with the right training—the kind of training I give you in the N. R. I. course—have stepped into Radio at two and three times their former salaries.

Get Ready now for Jobs Like These

Broadcasting stations use engineers, operators, station managers, and pay up to $5,000 a year. Manufacturers continually employ testers, inspectors, foremen, engineers, service men, buyers, for jobs paying up to $6,000 a year. Radio Operators on ships enjoy life, see the world, with board and lodging free, and get good pay besides. Dealers and jobbers employ service men, salesmen, buyers, managers, and pay up to $100 a week. My book tells you about these and many other kinds of interesting radio jobs.

Many N.R.I. Men Have Made $200 to $1,000 in Spare Time While Learning

The day you enroll I send you material which you should master quickly for doing 28 jobs, common in most every neighborhood, for spare time money. Throughout your course I send you information on servicing popular makes of sets; I give you the plans and ideas that have made $200 to $1,000 for N.R.I. students in their spare time while studying. My course is famous as the course that pays for itself.

Talking Movies, Television, Aircraft Radio Included

Special training in Talking Movies, Television and home Television experiments, Radio's use in Aviation, Servicing and Merchandising Sets, Broadcasting, Commercial and Ship Stations are included. I am so sure that N.R.I. can train you satisfactorily that I will agree in writing to refund every penny of your tuition if you are not satisfied with my Lessons and Instruction Service upon completion.

64-Page Book of Information FREE

Get your copy today. It tells you where Radio's good jobs are, what they pay, tells you about my course, what others who have taken it are doing and making. Find out what Radio offers you without the slightest obligation. ACT NOW!

I have doubled and tripled the salaries of many. Find out about this tested way to BIGGER PAY

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Dear Mr. Smith: Send me your free book. I understand this request does not obligate me.

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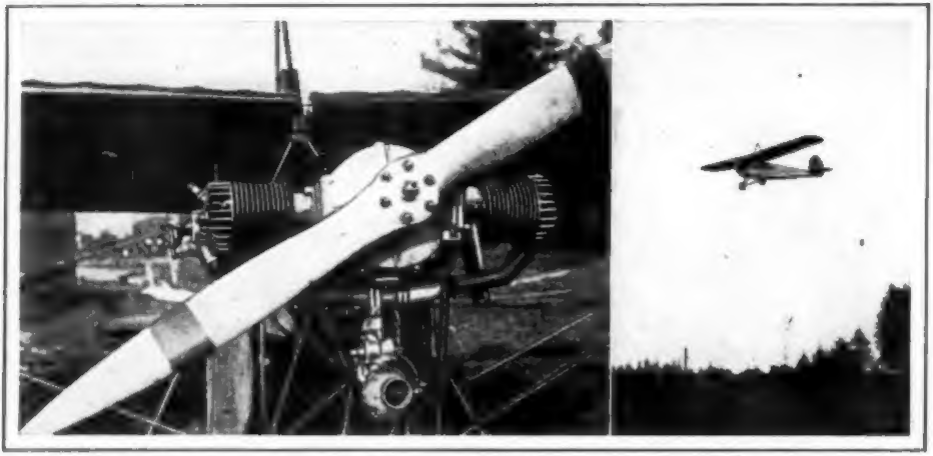


Lee Long, of Cornelius, Oregon, contributes this highly satisfactory conversion of Harley motorcycle parts to the progress of American light plane development. Parts from a 74 Harley are used. Does the engine fly? Lee shows a pic of the Longster in the air. Motor sells for $195.00. Long is the designer of the popular Longster monoplane published in M.M.

Andy's Shop Mail Box

Of Andy, M-M's Grease Monk who runs this column, a famous publisher once said, "He has the knack of getting himself read." Barge in and see why!

HYELL-L-LO everybahdee-e! This is **not** Kate Soso and I'm not trying to get the moon over any mountain.

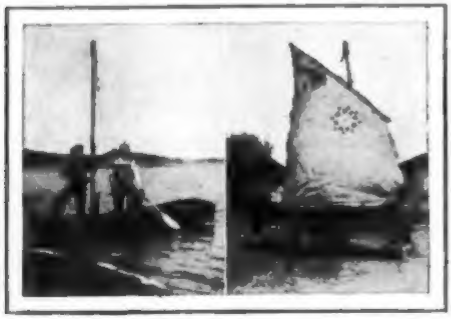
It's just me—Andy. Thought I'd show youse how not to say hello. Pfffffft!!

• • •

I was thinkin' about radio when I started out this colyum. And why I should be thinkin' of the abuses to which this great boon to mankind has been put I canna tell ye.

Maybe it's my characteristically sour mood—sauerkraut is coconut shreds to me.

But when I gotta eat dinner at the local hash house after a long day's work flying planes, building boats, handshaking, to say nothing of answering my 150 letters per diem, I'm tired. And when I slide into the row of stools for my hamburger, I've done a day's work. My noodle's been doing more ticking in five minutes than all the noodles that go into making one of these saccharine bromo-bono-semi-demi advertising spiels have done in a lifetime.



A man who had never been in a boat built this Rabl-designed "Tubby" from Modern Mechanics and Inventions plans. Ed. Widmar of Colorado is 'um.

Just about the time I get my bread buttered along comes some grand horse opera about shaving cream by a guy with a big bass voice who thinks he's playing Santy Claus to humanity. The thought of music and shaving cream and a guy who's so darn nice he expects the world to kiss him gags me like any other inconsistent combination at a supper table would. Right in the same class with oysters and whipped cream and chewing gum steak. I gets myself a good gag and half me appetite is gone.

If all the crooners and moon pushers and great day gents were laid end to end it would be a good thing.

Think of the increase of food consumption that would be brought about by non-interference with a man's gastronomic gagging function just as he wants dinner.

My cure for the depresh is to hand each of the breed a nice long stick of dynamite, pat 'em on the back, tell 'em they are great guys and that they are going to go a long ways and

(Continued on page 12)

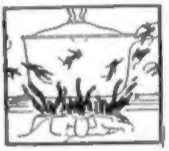
Strange Invention NOW SAVES 35% to 50% in Gas Bills

NEW, amazing, simple device that fits around gas range burner. For natural or manufactured gas. Furnishes full heating power in about half the time. Prevents discoloring of cooking utensils. Protects flames from overflow of liquids and against drafts from open doors and windows. Plenty of facts on file to prove that IMP rings actually cut gas bills up to 50%.

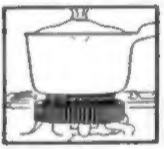
AGENTS $5.00 to $7.00 an hour

Easy to make this money by simply showing people how to cut their gas bills almost in two. Territory now being assigned. Be the first. Act quickly.

Men needed at once to introduce IMP rings in exclusive territory. Agents—Salesmen—Distributors—you never had a better opportunity to make money on an item that has such great appeal. No competition. 200% profit. A welcome awaits the agents who bring this amazing, money-saving invention to the bill-burdened consumer. No sales resistance.



Old way. Lost heat. Wasted gas. High gas bills. Discolored, smudgy cooking utensils.



The IMP way. Concentrated heat. No waste. Lower gas bills. Heat condensed under utensils. Ring protects pots, pans, etc. from discoloration. Flame protected against draft from open doors and windows.

READ WHAT USERS SAY

D. T. Maxin writes: "After using one IMP ring 30 days I noticed reduction of 25c compared with two previous gas bills. Please deliver three more rings for the remaining burners as soon as possible."

Mrs. Chas. Lindquist writes: "After installing IMP rings I have cut cooking time about one-third, which is reflected in my gas bills."

Mrs. E. G. Holly writes: "Have used IMP rings for the past 30 days and apart from the gas saving feature, I notice the lack of smoke and smudge on the kettles after cooking."

W. H. Peterson writes: "January gas bill was $5.30. February gas bill, after installing IMP rings, was $3.18."

Hundreds of similar letters on file prove the merits of this amazing, mysterious device.

IMP rings knock "Hades" out of gas bills, cutting them practically in two.

FREE DEMONSTRATOR

Demonstration convinces how, with IMP rings, heat is confined to the bottom of the cooking utensils. None escapes. None is lost. Every bit of gas is converted into heat for cooking. One demonstration shows anyone how IMP rings consume less gas and give more heat, thereby cutting cooking time 35% to 50% with its correspondent reduction in gas bills.

We have a plan to supply agents with a set of IMP rings for demonstrating purposes entirely free. Write today—at once—for complete details, exclusive territory proposition and free demonstrator offer.

ECONOMY APPLIANCES

1213-19 Van Buren St., Dept. 138 Chicago, Ill.

Economy Appliances,
1213-19 Van Buren St., Dept. 138,
Chicago, Ill.

I want to make money selling IMP rings. Rush details and your free demonstrator offer.

Name .....

Address .....

City ..... State .....

NOW FIX ANY MAKE OF AUTO

SIX BIG AUTO BOOKS ALL SHIPPED FREE

on approval; whether you want to qualify as garage owner, auto repair expert, or merely wish to know how to keep your own car 100% efficient, look at these books—they are sent to you for free examination. This brand new edition has been prepared by a large group of America's greatest automotive engineers. Anybody who can read will understand them, for this great automobile encyclopedia is a veritable gold mine of valuable facts. Take advantage of this offer now; send in the coupon for FREE examination. You don't pay us a penny, you don't obligate yourself to pay anything unless you decide to keep the books. Just tell us you want to see them and the full set of 6 great volumes, just off the press, will be sent to you. Read them, look them over and prove to your own satisfaction that one fact alone, which you will find in them, may save you an expensive repair, or help you to a better job.

AVIATION MOTORS
FREE WHEELING
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ALL FULLY COVERED

Brand New 1932 Edition

Imagine books which are so new that every page is right up to date—wiring diagrams, construction details, service problems—are all right up to the minute. Nowhere else can you get as complete and up-to-date information. Over a million dollars of resources have enabled us to give you the most authoritative books on the subject ever published. Everybody interested in automobiles in any way will welcome these books published by the world's largest publishers of Technical Cyclopedias (est. 1897) with agencies all over the world.

Complete Course in Auto Engineering included

There are no strings to this offer whatever. It offers you an unparalleled opportunity to forget the fear of wage cuts and lay-offs, to command a salary instead of wages and become an expert or executive instead of mere workman. The automobile industry is coming back with a BANG—soon you will have your opportunity if you're ready for it.

On this great offer you get the benefit of a complete course of instruction which would cost you almost $100 elsewhere.

You must promise to spend thirty minutes a day (on an average) with the material we send you. You must convince us that you are really serious and want to make progress. The low price quoted is for advertising purposes only and when these courses are sold we will have no more to offer at this price.

Think of it. We send you the complete course, including six big automobile text books, then if you are perfectly satisfied you send $2.00 in 10 days, then only $3.00 a month until the total price of only $29.80 is paid—And—think of this—these books alone have never been offered for less than $24.80.

Privilege of consulting engineers of million-dollar American Technical Society on any automotive problem for one year also included without charge, if you mail coupon immediately.

SEND NO MONEY

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I would like to see the brand new 6-volume edition of your automobile books. I will pay the few cents delivery charges only and will examine the books and lesson sheets and return them at your expense in 10 days unless I like them, in which case I will send you $2.00 then and only $3.00 per month until the special price of only $29.80 is paid. You are to include free, consulting membership certificate in the American Technical Society and complete course of instruction. Send 1932 edition.

Name .....
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Employer's Name .....
Employer's Address .....
The coupon must be filled out in full. If not employed write us a letter explaining your work.

ANDY'S SHOP MAIL BOX

(Continued from page 10)

that they better take the radio announcers with them.

* * *

Add another to our monthly Gallery of Startling Snapshots: a pic of a glider being released from a kite in accordance with Lieut. H. A. Reynolds' article on glider soaring which appeared in April Modern Mechanics and Inventions.

The shot, depicted in this colyum, shows the all-balsa American Junior Soaring Model cutting loose on the occasion when it flew miles out of sight on Sunday, April 24, 1932. A little late, but good.

Here's a pic of Lieut. H. A. Reynolds' soaring glider cutting loose from a kite. This glider and kite were made by a group of New York readers from plans in the April M-M.

One of the things that old Sam Wing of the Mechanical Package Magazine has been dinning in our ears is his contention that all how-to-build stuff should not merely be practical to build, but that plenty of it should challenge the imagination.

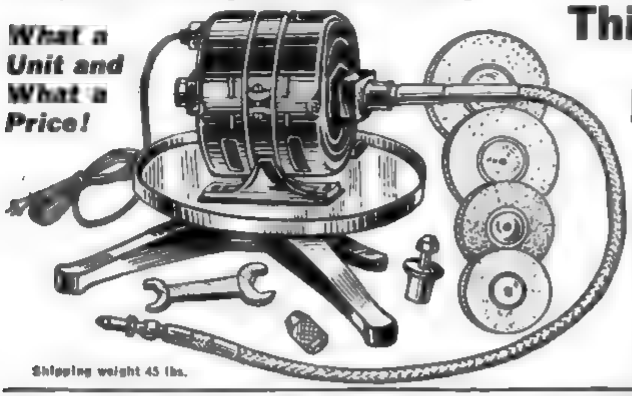
He says there is too much lace doily and what-to-do-with-old-bottle-caps junk in all mech mags.

Now I'm not as rabid on the subject as is Samuel, who refuses to print anything but big medicine like boats, engines, and airplanes in the Mech Pack Mag, but he is certainly right

(Continued on page 14)

WORKSHOP EQUIPMENT BARGAINS!

Take advantage of this rare buying opportunity that may never come again. Lowest prices in history. We sell every article listed here with an absolute guarantee to be as represented or money refunded. All prices are F.O.B. Chicago.



What a Unit and What a Price!

Shipping weight 45 lbs.

This Ball Bearing General Purpose Flexible Shaft Unit

A real high-grade unit, built to last a lifetime. Equipped with ¼ H.P. electric motor, heavy duty, 110-volt, 60-cycle, with 8-ft. cord and plug and tool tray base. Shaft is 56" long, casing spring steel flexible tubing, bright nickel plate. Handle black fibre, non-heating. Just the unit for commercial or home workshop, garages, repair shops, etc. Less accessories.

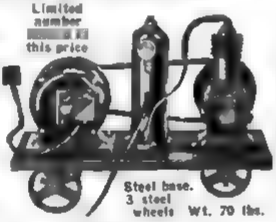
Amazingly low price..... $21.75

Send $5 deposit with order, bal. C.O.D. Satisfaction guaranteed or money back.

Electric Portable Sprayer

Startling offer Famous spraying outfit Includes GV full liquid pressure type gun, adjustable non-clogging nozzle having 10" swath Ideal for spraying paint, [illegible], enamel, lacquer, etc., the power way [illegible] time, labor and does better work Big opportunity to make extra money with it. Has Kellogg air cooled compressor, size 1¾x1¾ This $68.50 outfit—now only $27.50.

Limited number at this price



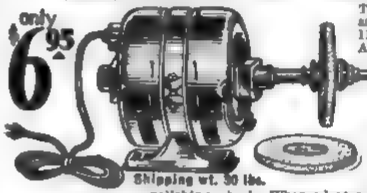
Steel base. 3 steel wheels Wt. 70 lbs.

Reg. Price $68.50

our price $27.50

Complete with Spray Gun, Fan and Round Spray Tips ¼ H P., 110 Vt., 60 Cycle A. C. Motor, Air Filter Tank, Pop-off Valve, Connectors and 20 ft Hose. Plug and Cord Send $5.00 deposit Balance C O D Money back if not satisfactory

HEAVY DUTY 1-4 H. P. MOTOR



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The ideal unit for any workshop. 110 volt, 60 cycle, AC, with 8-ft. cord and plug. Comes equipped with motor adaptor for polishing, grinding, buffing, drilling and 5" grinding stone and polishing wheel When adaptor is removed, motor can be used for general purposes. Never before sold at this low price Complete, only $6.95

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This gun sold for as high as $30.00. Has 12-inch spread. 20 to 30 lbs. pressure. Perfect spray for any kind of paint job. Send $2.00 deposit Only with order—balance C. O. D. $5.95

Ideal for Any Work Shop

Save Money by Buying Now

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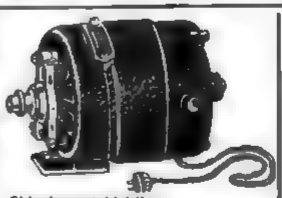
Will cut at any angle from 0 - 90. Tipping and cross-cutting Maximum width 6", depth 2". Convenient lever for lowering and raising table with thumb screws for fastening table in any position to cut any desired depth. Table tilts to 45 degrees Table top is 11x14 in. Bronze bearings set at wide center to assure smooth operation. Furnished complete with V pulley and 6" combination saw blade Complete with base and ¼ H.P. heavy duty motor, 110 volt, 60 cycle, AC, and 8 ft cord and plug. Extremely low price $16.95

Value $10 Now Only $2.95



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GRS UNIVERSAL MOTOR

Wonderful motor at an unbelievably low price 110 volt, AC or DC, approximately 12,000 RPM, with motor shaft, adjustable brake for speed control, extension cord and plug. Ideal for cameras, sound units small grinders, buffers, mixers and for any number of general purposes Send $1.00 deposit—bal. C O D Satisfaction guaranteed or money back Total price only $2.95

FILTER TANK AT NEW LOW PRICE

$4.45

Compressed air filter and expansion tank, equipped with gauge and safety valve Has standard taps in tank and base ready to install New low price $4.45

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NATIONAL ELECTRIC TOOL CO., Dept. 346 111 West Lake Street, Chicago, Ill.

former laborer now earns $20,000 a year

"Yes, that's all I was — just an ordinary laborer, working for the highway department in my state. I was young and had ambition, it's true, but I had no special training and had left school early because of family reasons. One day I was talking to the superintendent and asked him how a man got ahead in the construction business. He told me that he had taken a Highway Engineering Course with the International Correspondence Schools when he was a young man, and suggested I do the same thing.

"I did. I stuck to my spare-time study and finished it. After that I made real progress.

"Today I am a road contractor in my own right. Last year my net profit was $20,000. And I give much of the credit to I. C. S."

Does this *true* experience suggest an idea to you? Trained men get ahead today — why not be a trained man? Mark and mail the coupon, today!

INTERNATIONAL CORRESPONDENCE SCHOOLS

"*The Universal University*" Box 2325-Q, Scranton, Penna.

Without cost or obligation please send me a copy of your booklet, "Who Wins and Why," and full particulars about the subject *before* which I have marked X.

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☐ Reading Shop Blueprints
☐ Telegraph Engineer
☐ Telephone Work
☐ Mechanical Engineer
☐ Mechanical Draftsman
☐ Machinist ☐ Toolmaker
☐ Patternmaker
☐ Pipefitter ☐ Tinsmith
☐ Bridge Engineer
☐ Bridge and Building Foreman
☐ Gas Engines ☐ Diesel Engines
☐ Aviation Engines
☐ Automobile Mechanic
☐ Plumbing ☐ Steam Fitting
☐ Heating ☐ Ventilation
☐ Sheet Metal Worker
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☐ Wallpaper Decorating Salesmanship
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☐ Civil Service
☐ Mail Carrier
☐ Railway Mail Clerk
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Name . . . . Age .
Address .
City . State .
Occupation .

If you reside in Canada, send this coupon to the International Correspondence Schools Canadian, Limited, Montreal, Canada

ANDY'S SHOP MAIL BOX

(Continued from page 12)

in calling attention to the fact that editors of magazines intended for popular consumption underestimate the average intelligence of the reading public as surely as radio broadcasters put on the sugar for what they consider their five-year-old listeners. Nothing offends a guy as much as that kind of tripe.

So we're fortunate in realizing that some of the stuff we publish is a little too large for plenty of shops and plenty of pocketbooks, but as Sam Wing contends, there is no law against building stuff in the air in front of a fireplace while you lie on your belly looking at the sparks.

That kind of building gets ambitious and needs ambitious plans.

Sam's whole contention is summed up in this letter which wandered in here the other day:

Los Angeles, Calif.

Dear Andy:

I enjoy your column in M. M. immensely. The Shop Mail Box is the first thing I read when I get the magazine.

Until I grow older I will have to content myself with building models and envying you lucky stiffs. Adios.

Yours truly,
JAMES T. BAUGHMAN.

Aren't all of us like this?

You betcha me eye, Jim. And when we get older we go the other way, and wish we weren't so old and dignified so we could play with toys. The main idea is that there is great good sport in doing things.

That's why this Modish Mekaniks and Intentions is published.

• • •

It's not manly to kiss a guy. But if any of you have a good substitute, send the idea along because I want to confer one on Ed. Widmar.

Out in Walsenburg, Colorado, Ed has read the logical sensible explanation of an editor's hair shirt in this colyum. It was the explanation about why so few shots ever showed up of stuff that had been built from M-M plans. Plenty of pix have shown up, of course, but only a fraction of the amount of stuff actually built.

Well, Ed is enterprising, in contrast to the modest lilies who are afraid to tell me what they're doing, and he sent in two swell shots of the little Rabl-designed Tubby he built. They're printed on the first page of this yere colyum.

Three bucks each for fotos used, youse mugs. And I should ask you to try to make the Mail Box.

See what I mean:

Walsenburg, Colo.

Hello, Andy:

I noticed in your last issue of M. M. that you craved more action in replies to your "How to Build" articles. I am writing to tell you that I built "Tubby" and which I think is a mighty fine boat for a beginner. I never did build a boat or ride in one before I made this one, but I'm living on water now.

(Continued on page 16)

INVENTS AMAZING HOME CIGARETTE MACHINE

CAPTURES FACTORY SECRET

Cuts Cigarette Cost More Than Half!

NOW a startling little machine promises to revolutionize the smoking habits of a nation—to start a great far-reaching campaign of thrift! It is called ROLL-O-MATIC. Entirely different from ordinary, make-shift devices. ROLL-O-MATIC is actually a tiny factory machine—a midget mechanical marvel—utilizing principles employed in the manufacture of factory-made cigarettes. Requires no special glued, gummed or tube papers. Ends unsanitary wetting of papers with lip or tongue. No fuss, no bother—nothing to get out of order. Just turn the crank—and there's your cigarette, like magic! ROLL-O-MATIC ROLLS and SEALS 20 cigarettes in five minutes—cigarettes so marvelously finished you can't find a difference (and your friends can't either) from ready-mades. They LOOK and TASTE the same—draw perfectly. Yet the way gives you 30 or more "smokes" for 10c. Think of it!

Just consider this: In all states you pay a tax of at least 6c a package for ready-mades. With ROLL-O-MATIC you "roll your own" with a de luxe blend of the same fine Turkish and domestic tobaccos—and you get individual cigarettes equal to the best for less than half. Out of every two you smoke, one is practically free!

THEY'RE LIKE TWINS
Make this test. Place a ready-made and a ROLL-O-MATIC cigarette side by side. Try and find a difference. They're TWINS in everything except cost!

Precision-made and handsome, ROLL-O-MATIC instantly captivates women—amazes all smokers. Makes a day's supply of cigarettes at one time. Medicated, mentholated and perfumed cigarettes can be made. Complete outfit for monogramming offered. Papers available in almost any shade, with gold tips if desired.

AGENTS...DEMONSTRATORS DISTRIBUTORS

Millions of smokers already turning "penny wise"—everyone a prospect. Big chance for $18 to $25 and up in a day with this most sensational money-maker in many moons! No competition. Liberal commission plan. All year round profits, full time or spare time. Low price and economy appeal make sales easy—one minute demonstration proves it. Don't wait. Get complete story of this fascinating personal use home cigarette "factory"—and full details of how you can test it—at our risk. Exclusive territories still open—but going fast. Mail coupon at once for AMAZING FACTS and FREE TEST OFFER. Address Marden Mfg. Co., Dept. K-30, 11-15 Main St. N. E., Minneapolis, Minn. Manufacturers of automatic machin-

ROLL-O-MATIC
THE AUTOMATIC PERSONAL USE CIGARETTE "FACTORY". Not a pocket device. All metal construction, with baked-on satin finish. Size 5 in. by 5 in. by 3 in. Precision made—rollers, etc., of solid brass, nickeled. Guaranteed. Lasts a lifetime.

TOBACCO AND PAPERS INCLUDED

MARDEN MFG. CO.,
Dept. K-30, 11-15 Main Street N. E.,
Minneapolis, Minn.

Rush full details about ROLL-O-MATIC—with free TEST OFFER and facts on how I can earn big money easily

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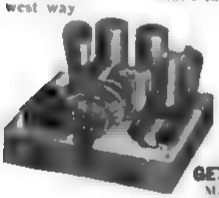
Midwest 13-Tube, 15-Tube ALL WORLD-ALL WAVE

only $37.50 COMPLETELY ASSEMBLED — WITH — LARGE DYNAMIC SPEAKER

These sensational new Midwest ALL-WORLD, ALL-WAVE 15 to 550 meter sets bring you the WHOLE WORLD of RADIO! SHORT-WAVE and standard wave broadcasts not only from U. S. stations, coast to coast, but from many foreign countries. Canada, Mexico, Cuba, Hawaii come in like locals. Scores of letters on file in our office show that Midwest users are enjoying programs from Australia, England, France, Italy, Germany, Japan, Chile, Ecuador and many other foreign stations. Police messages and airplane conversations give an added thrill. You'll be positively amazed and delighted.

30 DAYS TRIAL: Select the Midwest you want and try it 30 days—free—in your own home. Satisfaction or no sale—that's the Mid west way.

11 TUBE SUPER HET. REAL AUTOMATIC VOLUME CONTROL. BALANCED SUPER HETERODYNE UNIT. PIN DOT SELECTIVITY. LARGE SIZE ELECTRO-DYNAMIC SPEAKER that reproduces voice or music without distortion. The season's outstanding radio sensation. And you buy it direct from Mid west factory at a positive saving of 30% to 50%. 30 days free trial—and easy payments if you wish. Coupon brings full details — mail it NOW!



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Converts any A C set of adequate sensitivity into a short-wave receiver for reception of U. S. and foreign short wave broadcasts, airplane conversations, ships at sea. Only $16.75 completely assembled. Coupon brings full details. Mail it now!

GETS GERMANY, ITALY, FRANCE

March 2nd I picked up Germany, France and Italy. On the following day, I got Rome again and heard all the music from the Royal Opera "Home." A. Musconi 7122 Paschall Ave., Philadelphia, Pa.

BUY DIRECT FROM FACTORY

Every Midwest set is fully assembled thoroughly tested comes to you ready to plug in, and is backed by an absolute guarantee of satisfaction. Mail coupon now! Get all the facts before you buy a radio of any kind.

MIDWEST RADIO CORP., Dept 80, Cincinnati, O.

Sign and Mail NOW!

MIDWEST RADIO CORP., Dept 80, Cincinnati, Ohio.

Without obligation send me your new 1932 catalog and complete details of 13 and 15-tube All World, All-Wave Combinations, 4 tube Converter, 9 and 11-tube Super Heterodynes, low factory prices, easy terms and liberal 30-day free trial offer.

Name .....

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Town ..... State .....

ANDY'S SHOP MAIL BOX

(Continued from page 14)

The "A. B. C. of Small Boat Sailing" article in your June issue came in very handy to me, and no doubt to many others who are building this boat. As yet I have made no fast trips as the wind seems to have gone on a vacation just when I want it to blow. Meanwhile I can get a lot of practice which I have learned is a good thing to have.

I've been buying M. M. since the time you were running the "Heath Parasol" plane plans, and I think it's the best book out. I got a pleasant surprise when I opened the June issue to see seven "how to build" articles in it. I'm for more "how to builds" on radio, boats, racing cars and planes. Which reminds me I would like to see a racing car plan using a Ford motor, somewhat like the one of W. Pricer's. He had a picture of it in last year's June issue when you were running the "Baby Auto Contest." It need not break the world's records in speed just so it looks "speedy" to the eye, savvy?

So long till next time,

3D WIDMAR.

P. S. Enclosed find two pictures, the first one which is on a cart ready to go to the lake. The second was taken after our first trip.

Recognize the M-M Secondary Glider in this? Frank Kelsey, Salt Lake City, Utah, built it. Here is visible evidence showing the glider in flight on event which set a 27-minute flight record for the State of Utah. Great work, Frank.

One of the most proud things I am of this issue is the letter which Frank Kelsey of Salt Lake City sent me.

Like my other enterprising readers Kelsey has had the rare good sense, business foresight and acumen to pass along for the Gang pix of his glider project (of which project more anon) and what he has done with it.

(Continued on page 20)

RAILWAY POSTAL CLERKS

$158 Month First Year; Raise to $225 Month

Many Other U. S. Government Jobs Open to Men and Boys 18 to 50

Post Office Clerks—City Mail Carriers—Rural Mail Carriers—Clerks—Customs and Internal Revenue Service Customs Inspectors—Immigrant Inspectors—Prohibition Agents

These are steady positions. Strikes, poor business conditions, lockouts or politics do not affect them. U. S. Government employees get their pay for full twelve months every year. There is no such thing as "Hard Times" in the U. S. Government Service

ALLOWANCE FOR HOTEL EXPENSES

Railway Postal Clerks now get $1900 the first year, being paid on the first and fifteenth of each month, $79.16 each pay day. Their pay is increased $100 and $150 a year. The maximum is $2700 a year, $112.50 each pay day. They get extra allowance for hotel expenses when away from home.

PAID VACATIONS

Railway Postal Clerks, like all Government employees, are given a yearly vacation of 15 working days (about 18 days). When on long runs they usually work 3 days and have 3 days off duty or in the same proportion. During this off time and vacation, their pay continues just as though they were working. When they grow old they are retired with a pension. Railway Postal Clerks are continually traveling. They are furnished with a railroad pass for official business.

CITY MAIL CARRIERS—POST OFFICE CLERKS

Clerks and Carriers get $1700 the first year regularly and automatically increase $100 a year to $2100, with further increase to $2300. They also have 15 days' vacation.

What Will You Earn 5 Years From Now?

DO YOU EARN $1900 EVERY YEAR? HAVE YOU ANY ASSURANCE THAT A FEW YEARS FROM NOW YOU WILL GET $2700 OR MORE A YEAR, EVERY YEAR?

MAIL COUPON TODAY

FRANKLIN INSTITUTE
Dept. T-312,
ROCHESTER, N. Y.

Rush to me entirely free of charge 32 page book with (1) a full description of the position checked below; (2) a list of U. S. Government Steady Jobs now obtainable; (3) Tell me how to get the position checked.

—Railway Postal Clerk	($1900-$2700)
—Post Office Clerk	($1700-$2300)
—City Mail Carrier	($1700-$2100)
—Rural Mail Carrier	($2100-$3400)
—Government Clerk—File Clerk	($1260-$2500)
—Inspector of Customs	($2100-$3300)
—Immigrant Inspector	($2100-$3000)
—Prohibition Agent	($2300-$2800)
—Patrol Inspector	($2100 up)

Name .....

Address .....

Use This Coupon Before You Mislay It—Write or Print Plainly.

Get FREE List of Positions

Fill out the coupon. Tear it off and mail it today—now, at once. DO IT NOW—This investment of two cents for a postage stamp may result in your getting a life U. S. Government Job.

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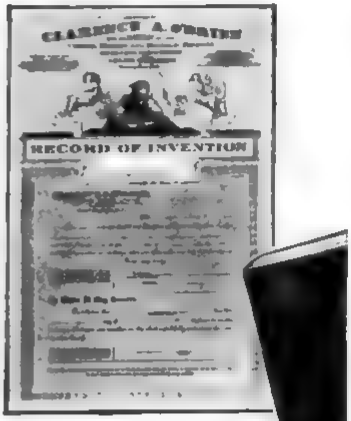

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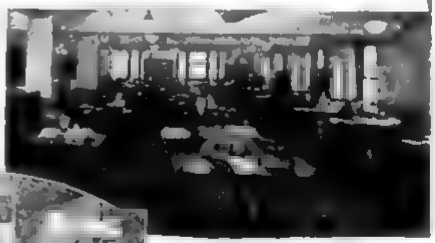


CLARENCE A. O'BRIEN

Registered Patent Attorney

WASHINGTON

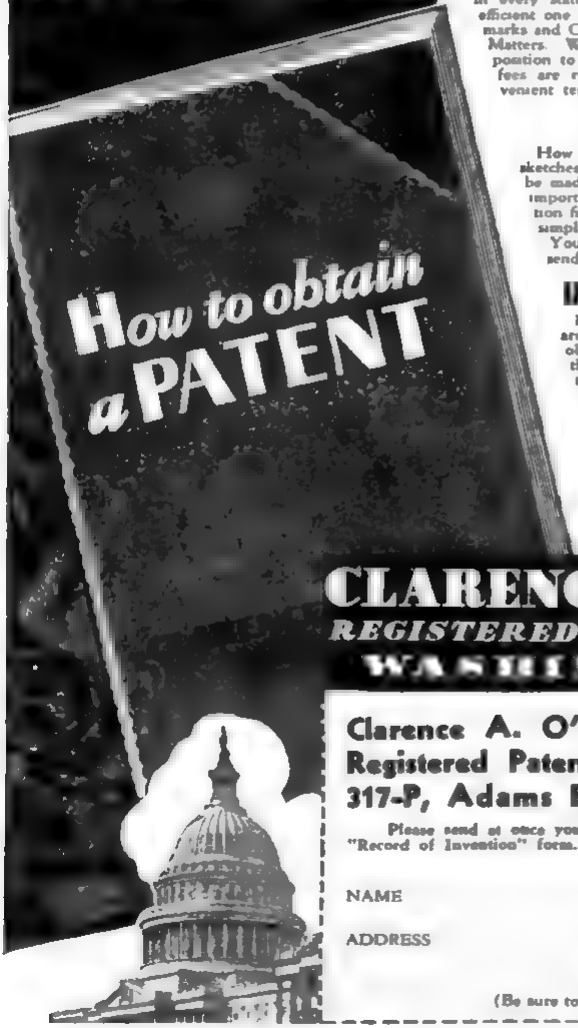
D. C.

My Location in Washington

My offices in Washington are convenient to the Patent Office, and I and my assistants can, therefore, appear promptly before the officials and Examiners.

TENTS

FOR... INVENTORS



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ANDY'S SHOP MAIL BOX

(Continued from page 16)

Incidentally, a few copies of the 1931 Flying and Glider Manual, which contains plans for the MM Secondary Glider, among other things, are still available at this office for 50 cents, the half part of a dollar.

Sorry I can't run the sketches (cramped for room) but here's the missive:

Salt Lake City, Utah

Dear Sir:

Two years ago plans appeared in the Modern Mechanics magazine for a Northop primary glider and a ship was built from them by myself and I was very pleased with the performance. Later in the Handbook a short article was printed about the ship and now I am immensely pleased to announce that we have built a replica of the Modern Mechanics Secondary. This ship has performed so extraordinary that it holds the soaring record for Utah of twenty-seven minutes and the altitude record of over eight hundred feet above the takeoff point. This ship has also made soaring flights up to seven minutes consistently, and the twenty-seven minute flight was made just before this writing. It appears that flights of several hours are possible as skill permits.

This ship has had over 500 flights since construction and has been flown by members of the Scenic Center Gliding Assn. of Salt Lake City of which I am President. The changes mentioned were a more carefully streamlined enclosure around the pilot and a larger wing to accommodate the high altitude of our soaring grounds as Salt Lake is about 4,500 feet and the point of the mountain is considerable above that. Inclosed are several shots of the ship on the record flight and some shots on other flights together with pictures of the club. All flight pictures were taken from the point of takeoff. This flying took place at the point of the mountain which is about 25 miles south of Salt Lake on a 400 foot ridge facing Lehi Valley. A downwind landing at the point of takeoff was performed after the record flight and although the pilots flying this ship have only their "A" license it has demonstrated that "C" licenses are possible and trial for them is planned about the time you receive this.

Another interesting part of this ship is the shock absorbing wingtip skids that I have tried out and that can be attached to any ship with very little trouble and expense. A tripod arrangement was constructed of ⅜" ash with steel tube sockets on the ends that fasten to the wing and plates on the other. This skid has performed very excellently while training students and stream lined fairing was added for soaring. This works on the tail skid principle, using innertube for rubber. Although these skids can be made from steel tubing, expense usually favors the ash.

Our club was organized by myself because of difficulty in getting fellows to help with the flying without equal flying. Since then

(Continued on page 22)

"BELIEVE ME, I KNOW IT!"

"When I read Mr. Parks' statement in a recent issue of Aero Digest, it clicked! I'm flying a transport run today on the strength of what I got at Parks, and I can assure you that what Mr. Parks said is the plain truth, . . . no more, no less. Any pilot who knows what's ahead of him will tell you the same thing."

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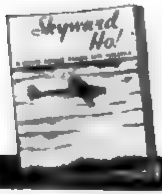

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ANDY'S SHOP MAIL BOX

(Continued from page 20)

we have constructed a soaring ship with a forty-five foot spread which will be finished about the first of June. A school will be started with the secondary and members will continue their flying in the soarer. We have seven members and find this is about as few as we can operate with. At our glider port there are four other clubs besides ourselves and most flying is on Sunday although we do quite a bit on week days. As our flying is close to the State highway we usually have the highway lined with spectators and a meet is being planned with several clubs through the state.

Yours for more glider plans,
FRANK KELSEY,
Pres. S. C. G. A.

The extremely interesting shots which accompany will enable you to immediately recognize the fidelity with which the M-M Secondary trainer has been built. And doesn't she look nice in the air?

* * *

Mrs. Joe Martin, the Chimpanzee, wrote in to ask whether I'd be interested in corresponding with another monkey. Would I send my picture? Was I handsome?

Would I and was I!

Look at this. It is the second picture ever published of Andy the Grease Monk, and just to prove I know my mechanics, looka that saw and my famous sour look. Seriously, the guy that ever gets my picture in a magazine will have a harder time than with J. P. Morgan.

Here you are folks! This is the Grease Monk, Andy, himself in person. Proving that the guy who writes this column is a carpenterin' fool.

(Continued on page 26)

A Blessing in "Hard Times"

New Soles as low as 9¢ A PAIR

FREE SAMPLE SAVASOLE

To Readers of Modern Mechanics

See this amazing new discovery that ends shoe repair bills—makes buying new shoes unnecessary. It's called SAVASOLE—a scientific plastic material which spreads on worn soles and heels like spreading butter on bread. Hardens overnight. Makes "worn-out" shoes like new—makes them wear for months and months. Cost of half soles with Savasole as low as 9c a pair. The plastic material fills in all cuts, holes, cracks, forming a smooth, flexible, waterproof, non-skid surface. A patch for a penny, or a new half sole for a few cents. Agents and distributors CLEANING UP with this sensational "hard times" specialty. New low price means [illegible] for Free Sample on leather and dog [illegible]. Learn how YOU can earn up to $42 A DAY with Savasole.

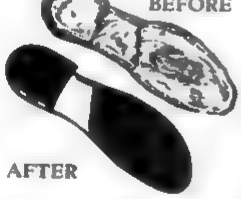
Pays Agents up to $42 A DAY

Dries Hard and Smooth Overnight

No more taking shoes to the cobbler. No paying from $1.00 to $1.75 for leather or rubber soles and heels. No more pegs, nails, or stitches to hurt the feet. No more shoes pulled out of shape by stiff leather half soles. No more buying new shoes. Just spread SAVASOLE on the worn-out soles and heels or merely patch the worn spots. Let it dry overnight. In the morning you have a new wearing surface that is hard, smooth and durable. Flexible—comfortable—will not "draw" the feet. Wears like leather and is absolutely waterproof. CAN NOT COME OFF. Your satisfaction is GUARANTEED.

1001 USES Savasole is splendid for repairing auto tires, auto tops, boots, rubbers, gloves, galoshes, harness, leather belts, canoes, tarpaulins, sporting goods, garden hose, leather furniture—any thing made of leather, rubber or cloth can be easily and cheaply repaired or resurfaced with Savasole.

Here is an old shoe, worn down ready to be sent to the robber, who would charge $1 to $1.75 for a first-class job.



Here is the same shoe repaired with SAVASOLE. No hammer, nails or pegs. Just use an old knife. All cracks and breaks filled in and covered up with long wearing smooth flexible, water proof, non-skid surface. SAVASOLE repairs shoes for one-tenth the cost of ordinary heels and soles.

AGENTS BREAKING PROFIT RECORDS!

Naturally, everybody is a customer for this amazing invention, which has scores of uses in EVERY household. Big margin of profit on quick, easy sales. Lewis sold over $20,000 worth of Savasole. Kimura just got $500 Cash Bonus IN ADDITION to his splendid earnings. Elford buys in 10-gross lots. Morrill, Pim, Baker and scores of others earning more money than they ever made before. Savasole is a marvelous "hard times" item. The poorer people are the more they need to SAVE money. And every set of SAVASOLE saves from $5.00 to $50.00 in repairs and new purchases.

ACT AT ONCE

Desirable territories are being "snapped up" by hustlers. Plenty of good territories still open. Get yours NOW! We show you how to make quick, convincing demonstrations that amaze customers and get the orders. Every family needs Savasole. Repeat business everywhere. Rush coupon now for Free Sample on leather and special starting offer.

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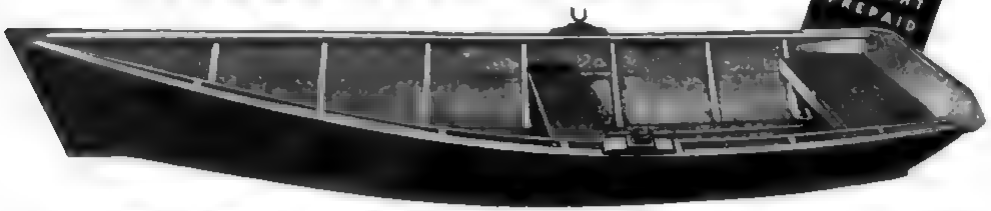

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ANDY'S SHOP MAIL BOX

(Continued from page 22)

This issue carries a yarn on tuna fishing. (Pronounced "fissing" by the Swedes.)

Now while I haven't got much money, due to the fact that I'm too cockeyed lazy to care, I know a guy who knows a guy who is crazy for fishing and who has a lot of dough. If any of you readers happen to be in the S. Cal. Tuna fleet and have a hot idea for making more money out of fishing, let me know.

I've got an airplane with floats and can go fleet spotter, dive-bomber, or general organizer for schools of fishes.

Adventure is paling around the home lot lately, and I yearn for new thrills. I'm homesick for the sea and a bankroll.

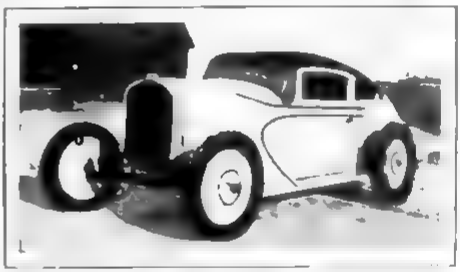
* * *

Not that I'm a disloyal son of the sod. Oh, no. Let me relate how I cured the grasshopper plague here the other day.

I test hopped a new Heath with a green prop. I came down and the back side of it was covered with 'baccy juice. Nice and brown.

On my takeoff I'd annihilated 347,928 grasshoppers with that Heath windmill.

And when I say windmill I mean wind and I mean mill. I've never seen so much wind from a prop you couldn't see turning or so much thunder from those insignificant looking little cans up front. I was more afraid of the roar of the motor than I was of the new ship.



The Mystery-F, by Froebe Brothers, of Homewood, Manitoba. Unique, speedy, safe is this low hung home-built job. They say she banks on turns.

The light car fans have it this inning:

Homewood, Manitoba

Dear Andy:

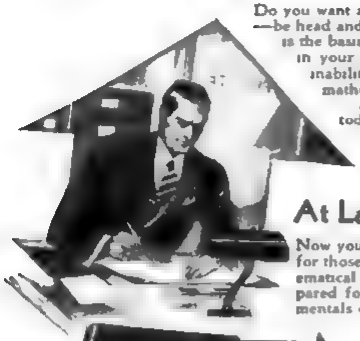
As a lot of the readers of this column are not aeronuts, we have decided to send in a picture of the "Mystery F" we made.

As our main idea was to make a non-upsettable car, it also has a great many other features of great importance. When making a sharp turn the body has a tendency to bank as an airplane or a motorcycle.

As it is bottom heavy (instead of top heavy) it is extra stable at top speed. In going against a strong wind, no noticeable speed is lost, on account of its small head and wind resistance, being only four and one half feet high. It is a four place, with extra wide door, eliminating a post in the center. There is plenty of room for a barrel of gas on the

(Continued on page 28)

Follow the Direct Road to SUCCESS



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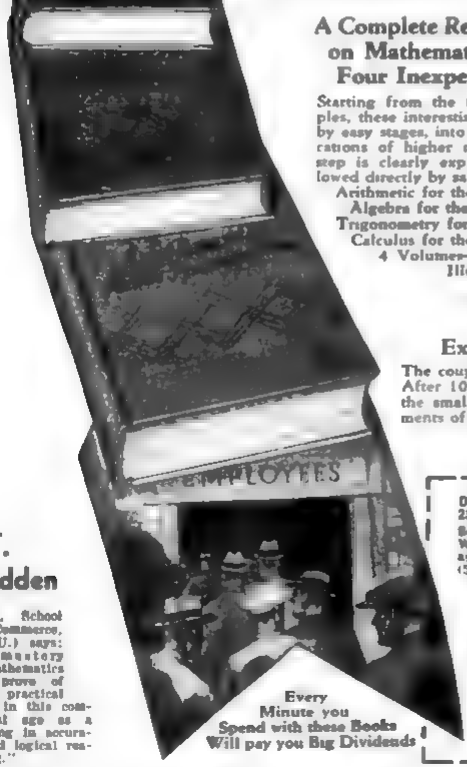

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ANDY'S SHOP MAIL BOX

(Continued from page 26)

rear that can be put on by only one person, it requiring 3 or 4 men to put a barrel on the ordinary truck that is three to four feet high.

Yours truly,
FROEBE BROTHERS.

The thought occurs at this point in our rambling remarks that other mags have their "With the Editors" pages and "What the Readers Say" but the thought comes to me what the heck of it. Around here we don't take ourselves so seriously.

What I think goes into the book and nobody can stop me. And I haven't got any violets to sell or big whoppers to tell. Just sort of a rambling rube takin' refreshment for himself just as you do from meeting an old friend every so often.

Maybe that's why the Shop Mail Box is really the only thing of the kind. You an' me knows they's plenty of imitators of us, ain't they, pardner?

I am the great original "So What?"

Here's a big model sailplane built by M-M reader Tom Ellis, of Handley, Texas. Write him if you want dope on this job. But don't bother Andy.

Model Fans, attend:

Dear Sirs:

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There you are, boys. Any of you who want to set up a kitchen airplane factory, communicate direct to Ellis. Ixnay on bothering this doddering old typeslinger. (P. S. I can run 100 yards a day.)

* * *

I started this colyum with an allusion to gas

(Continued on page 32)

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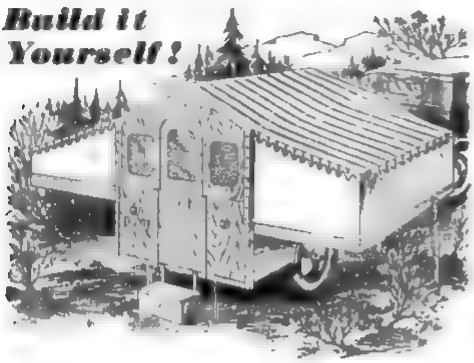
Bungalow Trailer

A House on Wheels



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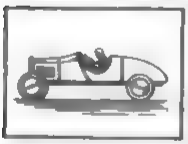
Blueprints giving details of construction are large size, easy to understand, all dimensions plainly shown. Scores of these trailers have been built with complete satisfaction to their owners. Price of blueprints, postpaid **$1.00**

Ford Speedster Body



Racing body for a Model T Ford or similar chassis. The simple wooden frame is covered with chicken wire, a layer of cotton batting placed over it, and the whole held down with a covering of Fabrikoid, or imitation leather, which makes the job look like one of those custom built imported French models. Choose any color combination you like. This body has a streamlined tail like the big-time speedway racers. Hammer and saw and a few small tools are all that are needed to construct it. Looks like a million dollars, but can be built at an insignificant cost.

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ANDY'S SHOP MAIL BOX

(Continued from page 28)

engines. I guess I can swing back to them if I wanta. The wee bonnie mootor that graces the 32 em cut at the head of this month's colyum shows Les Long's home made motor which he is rigging up to put into production.

And what is more, the right hand cut shows the Longster in the air, being supported there by the smoothly functioning motor.

As can be seen by a glance at the photo what Les has done is to design a base to adapt two Harley 74 cylinders to a common crank shaft.

You who are interested should promptly write Les Long, Cornelius, Ore. for datter.

* * *

A letter that takes the tears from my eyes and puts a good taste in my mouth comes from a gentleman way down in Lake Jem, Floridy, and suh, he doesn't sing any nahce lil' ditties, I betcha, because he is a straightforward cuss with a couple of good ideas and he isn't trying to tell you about a shady nook where you can get shaving cream where the birds are singing if you use shaving cream all in one breath:

Lake Jem, Fla.

Dear Andy:

If you will remember a few days ago I wrote you concerning a Sea-Skiff Cruiser, and, as yet, am at a loss as to where to send this, but then the conveyance of the Idea is what counts.

Why not let's all of us that are interested in Boats and Boating get together and form a M-M Boating or Yacht Club, using the M-M for headquarters, charging a regular membership fee to cover the cost of maintaining the department for which the M.M. could give us a course in Ship Carpentry and Construction, Boats to build etc., etc. If you think this could be done count me in as a member and my dues are ready to be forwarded at once.

Here's hoping that I will be writing in to the skipper of the M-M Boating or Yacht Club to give, or ask for ideas in the near future.

Sincerely,
O. W. CONNER.

Here's my answer to Mr. Conner:

Dear Mr. Conner:

I am sorry that MODERN MECHANICS AND INVENTIONS boating or yacht club sounds a little too ambitious to sponsor, but I am planning to run your letter in the Mail Box and we will see what kind of reception it gets from the readers.

ANDY.

Now let's hear from you boat bugs as to just what you want. Remember Beryl Seeley's letter last issue wherein he took a crack at us in a nice way for being a "tease sheet" on boat plans? In other words, what we ran was ace high keno but not enough of it. What do you say, now, you boat bugs?

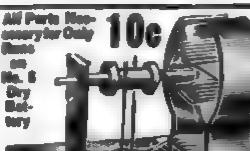
Offhand the project is ambitious. We don't want to start something and have it die aborning because we have misjudged interest in it.

(Continued on page 36)

All Parts Necessary for Only 10c

Use No. 6 Dry Battery

ELECTRIC MOTOR



An Electric Motor for Only 10 cents. Sounds almost unbelievable but it is perfectly true. For ONLY 10 cents we send you all the parts necessary packed in a neat box, with full printed and illustrated directions for assembling. No trouble at all putting the parts together, in fact it is FUN. Just follow a few simple instructions and in a few minutes the motor is ready to run.

AN EDUCATIONAL NOVELTY

OH BOY! Isn't it speedy. Runs on a No. 6 or similar dry battery. It is an education in itself just putting it together, and you can perform many novel and interesting experiments with it. Remember the price—ONLY 10 cents—nothing more to buy—nothing more to buy.

JOHNSON SMITH & CO., Dept. 901 RACINE, WIS.

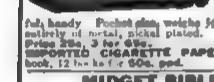
Little Wonder Crystal Radio Receiver $1

Say what you will about Electrical and Battery Sets, a CRYSTAL set has them all beat for simplicity and clearness of tone. There is absolutely no noise and no distortion—no batteries to buy—no tubes to wear out—no maintenance expense whatsoever. Cost nothing to operate and will last indefinitely. Reception is loud and clear. This Receiver is guaranteed to work equal to the most expensive Crystal Set you can buy. Has a receiving radius of over 25 miles, or under favorable conditions up to 100 miles. Constructed of the finest materials throughout, including a permanative crystal, assuring quick results. Complete with Ear Phone and Aerial Wire—everything all complete—nothing more to buy. $1.00 postpaid. Or complete with Ear Phone and Aerial Wire—everything all complete—nothing more to buy $2.95 postpaid.

BOY AMATEUR ELECTRICIAN 10c

The HOW and WHY of electricity fully told in simple language that any boy can understand. Scores of plans and instructions for making—dry batteries, dynamos, electric motors, telegraph apparatus, telephones, electric lights, electric door bells, alarms, electric engine, rheostat, mail box alarm, electro-magnets, automatic incandescent flash, electric shocking machine, wireless telegraph apparatus, induction coil, arc light, current reverser, etc., etc. Tells all about wiring, static electricity, magnets and magnetism, conductors and insulators, electrostatic induction, electroscope, electrophorus, condensers, Leyden jar, dynamic electricity, the voltaic cell, electro-magnets, electrolysis, electro-plating, electrotyping, how to build a radio for a few cents, etc. 64 pages, 100 illustrations. 10c. postpaid. JOHNSON SMITH & CO., Dept. 901 RACINE, WIS.

CIGARETTE ROLLER



Roll your own and save money. Better and cooler, saves more than half your favorite brand of tobacco. Neat, handy. Pocket size, weighs ¾ oz. Made entirely of metal, nickel plated. Price 25c, 3 for 60c.

IMPORTED CIGARETTE PAPER 5c. per book, 12 books for 50c. ppd.

TRICKS WITH MAGNETISM & ELECTRICITY

Book containing many unique and novel tricks and experiments with magnetism and electricity, also useful information about lodestones, magnetism, electricity, etc. 10c. Prepaid.

MIDGET BIBLE

GREAT CURIOSITY Smallest Bible in the World! Size of a postage stamp. 900 Pages. Sold to bring good luck to the owner. A genuine work of art. At last we can offer you the Midget Bible at a popular price. Make good money selling them to friends, church acquaintances, etc. PRICE 15c each, 3 for 40c, 12 for $1.25, 100 for $7.90. Also obtainable in Leather Binding with gold edges. Price 50c each, 3 for $1.25, 12 for $4.50 per doz. Magnifying Glass for use with Midget Bible 15c

250 Magic Tricks

An excellent little book containing nearly 300 tricks for parlor or stage that anyone can do. Tricks with cards, coins, handkerchiefs, eggs, bottles, string, etc. Also Second Sight, Shadowgraphy, etc. Profusely illustrated. 10c. p.p.d.

LEARN TO HYPNOTIZE

Big book over 200 pages tells how. Nearly 100 simple lessons on Hypnotism, Mesmerism, Suggestive Therapeutics, Magnetic Healing, Telepathy, Mind Reading, Spiritualism, etc. Specially prepared for self-instruction. Fully illustrated. 25c. Prepaid.

STAGE MONEY

With a bunch of these bills, it is easy for each person of limited means to appear prosperous by flashing a roll of these bills at the proper time and peeling off a genuine bill or two from the outside of the roll, the effect created will be found to be all that can be desired. Prices, postpaid: 40 Bills 25c, 320 for 50c, or $3.50 a thousand postpaid.

STAR TOY MAKER

Greatest boys' book written. Tells how to make a Pinhole Camera, a telephone, Boomerang, Telegraph Instrument, Box Kite, Talking Machine, Microscope, Electric Motor, Electric Door Bell, Water Wheel, Pocket Rifle, pair of Stilts, a Dog Sled, Bird House, Rabbit Yard, etc. 64 pages. 150 illustrations. PRICE 10c.

BOY'S OWN TOYMAKER. A new book. Tells how to make chemical toys, electrical toys, galvanic toys, mechanical toys, paper toys, cardboard toys, boats, traps, etc. 200 illustrations. Price 25c postpaid.

BOOK ON BOATS. How to build and sail model boats. Everything pertaining to boats explained in plain terms so anyone can understand. Illustrated. 10c p.p.d.

5-MINUTE HARMONICA COURSE. A new easy self-teaching method. Teaches how to play to tune like a professional. Fully illustrated. Price 10c postpaid.

MONEY MAKING SECRETS. Gives a opportunities for everyone. 64 page copyrighted book chock full of money-making ideas, recipes, formulas, wrinkles, trade secrets, etc. Assumes that can be started with little or no capital at home in spare time. 50c postpaid.

Good Luck Ring

Very striking, quaint and uncommon. Silver finish, skull and crossbones design, two brilliant, flashing gems sparkle out of the eyes. Said to bring good luck. Only 25c ppd.

WONDERFUL X-RAY TUBE

A wonderful little instrument producing optical illusions both surprising and startling. With it you can see what is apparently the bones of your fingers, the lead in a lead pencil, the contents opening to a pipe stem, and many other similar illusions. Price 10c, 3 for 25c.

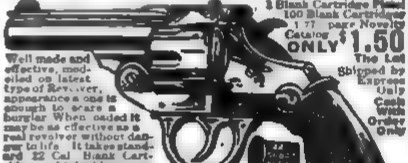
Repeating and Single Shot Air Pistols

Just what you've always wanted. A powerful high grade Air Pistol shaped like an Automatic pocket arm. Fires B B. shot obtainable anywhere. Very powerful yet perfectly safe for boys to handle. Two styles—Single Shot Pistol or Repeater. The Repeater fires 50 shots in one loading. The Single Shot Pistol shoots Air Rifle Darts in addition to B B shot. Well made and durable, all metal parts nickel plated; natural grain wood stocks. Front and rear sights. Weighs about 10 ounces. Better than an air rifle. No license required.

PRICES: Single Shot Pistol $2.75, 50 Shot Repeating Pistol $3.95. Not mailable. Shipped by Express only.

BLANK CARTRIDGE PISTOL

Protection against Burglars, Tramps and Dogs **Special Offer**



Well made and effective, modelled on latest type of Revolver, appearance alone is enough to scare a burglar. When loaded it may be as effective as a real revolver without danger to life. It takes standard 22 Cal. Blank Cartridges—obtainable everywhere. Special cash with order offer: 1 Superior quality Blank Cartridge Pistol, 100 Blank Cartridges and our new 770 (AK) De Luxe Catalog of latest novelties, all for ONLY $1.50. Shipped by Express only. Cannot guarantee barrel proof. Extra Blank Cartridges 50c per 100. Special Holster (Cowboy Type) for pistol 50c.

3 Blank Cartridge Pistol 100 Blank Cartridges 177 page Novelty Catalog ONLY $1.50 The Lot Shipped by Express Only Cash With Order Only

No C.O.D. shipments

BOYS! THROW YOUR VOICE

Into a trunk, under the bed or anywhere. Lots of fun fooling the teacher, policeman or friends.

THE VENTRILO

a little instrument, fits in the mouth out of sight, used with above for Bird Calls, etc. Anyone can use it. **Never fails.**

A 16 page course on Ventriloquism, the Ventrilo and 770 p. novelty catalog, ALL FOR 10c.

MICROSCOPE and FLOROSCOPE

OF THE MORE EXPENSIVE MICROSCOPE

SURPRISINGLY GREAT MAGNIFYING POWER

EXAMINE GERMS IN WATER, CHEESE, SUGAR, ETC.

There are few things so interesting and valuable as a Microscope. It enables you to minutely examine many animal and vegetable specimens to test cotton, wool, milk, seeds, water, flour, powder, food, in fact nearly all articles of food. Impurities, dust can be readily detected and ferments can be closely watched. It is exceedingly interesting to examine the spores of ferns, moth, eggs, hair, alum and other crystals, the dust (scales) from moth and butterfly wings, human hairs, flea and insects, while the animals in water are a never failing source of wonder. Most interesting experiments can be performed with an instrument such as this. Use a small piece of cheese in a box and allow insects to feed on it for a day or two. Then examine a tiny portion of the cheese under the Microscope and you will see little animals, magnified to the size of large beetles, and can count their legs and the scales on them. The total effect is awe upon each foot, also the hair of bristles upon their bodies. Or obtain some stagnant water, deposit a small portion of scum upon the object glass of the Microscope with a pin's head, and you will see beautiful animalcules swimming about with as much freedom as though they were fish in the boundless ocean. It is a truly wonderful sight and an endless source of interest and enjoyment for everybody. The Microscope is made of brass and is capable of magnifying 500 times, and although small and compact it will reveal a very wide range of microscopic research. PRICE ONLY 50c Postpaid.

JOHNSON SMITH & CO. Dept. 901 RACINE, WIS.

JOHNSON SMITH & CO.

Dept. 901 RACINE, WIS.

A copy of our 1932 CATALOG mailed on receipt of 10c., or the De Luxe Edition with cloth binding 25c. Bigger and better than ever. Only book of its kind in existence. Nearly 800 pages of all the latest tricks in magic, the newest novelties, puzzles, games, sporting goods, rubber stamps, mechanical models, curiosities, etc., etc., etc., too numerous to mention. Remit by Coin, Money Order, Check or unused U. S. Postage Stamps, for all articles listed above.

They Said It Couldn't Be Done--*But Here It Is!*

STEELFLEX
Health Rowboat
With Unbreakable Welded Steel Frame

now only $2.98 Complete *plus Small Delivery Charge*

No More to Pay!

Send No Money! See it First! 1 Week's Trial!

THE idea of home rowing has swept over the whole country! The Steelflex Corporation of America was the first to offer the American public a good home rowing machine at a really popular price. Naturally we as pioneers have built up a tremendous volume of business on the popular priced rowing machine field. It is this volume which permits The Steelflex Corporation of America to make the most amazing announcement it has ever made since it put rowing machines within the reach of all!

NOW AT LAST you can get a Steelflex Health Rowboat with unbreakable, welded steel frame FOR ONLY $2.98! This is not a flimsy "throw-together" machine purposely made to sell at a low price. It is a solid, substantial home rowing machine which does its work well and stands up! The frame is of welded steel without nuts or bolts. The seat is adjustable and well finished. There are double actuators with just the right amount of tension, and providing the compensating, automatic "pull-back" which utilizes the well known principle of resistance, endorsed by leading authorities on physical education.

For strengthening abdominal muscles and back.

It's FUN *to Reduce-Keep Fit The* STEELFLEX *Way*

Thousands who "hated exercise" now find it fun—rowing the Steelflex way! Thousands of men with bulging waistlines—men who were beginning to "slow down" and "feel their age"—are now getting back love, and thin, and energetic as when they were young fellows. Thousands of women who were losing the lines of youth—whose hips and thighs were causing them endless worry and dismay—are now getting slender and stylish again.

So confident are we that the new Steelflex Health Rowboat is the finest rowing machine that has ever been—or can be—sold at this amazing price, that we will gladly let you try it a week to prove that you will agree with us.

The full rowing stroke. Steelflex will stand any "pull".

Free Examination Offer

Just mail coupon. It is not necessary to send money in advance unless you care to do so. When the Express Company delivers the STEELFLEX you have the privilege of examining it. Note the strength and sturdiness of its welded steel frame. Try the tension of the double-actuators. See how attractive the STEELFLEX is in appearance. Judge whether you ever saw a bigger value at such a price! Then pay delivery charges and DEPOSIT the purchase price WITH THE EXPRESS COMPANY. They are instructed to hold your deposit for 6 days, subject to your command.

Use It a Week at Our Risk

—if it's pleasing you. If after 6 days' TRIAL in your own home, you are dissatisfied with it for ANY REASON (or for no reason at all) simply telephone the Express Company and they will call for the STEELFLEX and refund your money. NO SALESMEN WILL CALL ON YOU. You do not need to write Us for a refund. We do not receive a penny unless you are satisfied. YOU are the judge. With your STEELFLEX we will send a complete chart of various interesting and easily executed exercises. Act NOW. Do not let delay rob you of the many benefits of the STEELFLEX. Check on the coupon which model you want—and mail it at once without money to THE STEELFLEX CORPORATION OF AMERICA, Dept. 298, 1783 East 11th Street, Cleveland, Ohio.

. . . and the STEELFLEX with Silent Rolling Seat

Back and forth goes the rolling seat—just like on a real racing shell.

Many prefer that their Steelflex have a silent Rolling Seat—instead of the stationary seat pictured above. The Rolling Seat enables you to do every essential exercise possible with most expensive machines made! It provides racing shell stroke full leg and hip action, complete massage of abdominal and thigh region. Every muscle brought into play.

The wheels of the Rolling Seat are made of special rubber composition—hard in the center but with soft, silent, yielding tread that is

The Rolling Seat Model of the Steelflex Health Rowboat is only $3.25 more! If preferred, just check the box in the coupon.

SEND NO MONEY! FREE EXAMINATION COUPON

THE STEELFLEX CORPORATION OF AMERICA,
Dept. 298 1783 East 11th Street, Cleveland, Ohio

Please send me the Rowing Machine checked below, delivery charges collect. I am to have the privilege of FREE EXAMINATION upon arrival. If pleased with its appearance I will deposit the purchase price with the Express Company to be held by them for 6 days pending my final decision after trying the machine. If I do not notify the Express Company to return my money and return your rowing machine they are to remit to you. It is understood there are no further payments of any kind.

☐ Steelflex Health Rowboat—$2.98
☐ Rolling Seat Model—$3.25 Extra

Name.....

Address.....

City..... State.....

Canadian and Foreign Prices on Request.

THERE'S MONEY TODAY IN ART

THIS is the day of the artist. His skill is sought wherever design and color are important factors in the sale of merchandise.

Furniture, rugs, wall hangings, household utensils, wearing apparel, jewelry, art gifts, lamps, automobiles — nearly everything sold today depends on design and color to attract the eye of the purchaser. Drawings for advertisements in newspapers, magazines, catalogs, folders, posters, display cards and many other media call for the skill of the modern artist. Consider the number of drawings in this magazine alone! Art is a necessity in modern business.

If you like to draw, train this talent of yours and put it to work in a field offering rich reward. You can learn Commercial Art at home in your spare time. Many leading artists have contributed exclusive illustrated lessons to our courses.

Many of our students and graduates now earn $2500.00 to $6000.00 a year, some a great deal more.

Send For Our Free Art Test

It brings out your sense of proportion, design and color. Our instructors will give you frank advice as to your talent and probable chance of success. It costs you nothing. Just fill in the coupon below and we will send you this test together with our book "Your Future," outlining possibilities and showing examples of our students' work.

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Please send me free Art Test and book, "Your Future."

Name _____

Age _____ *Occupation* _____

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STOP THEFT

and EARN

$100 a Week

With This

AUTOMATIC GAS-LOK

Think of a combination lock and cap, which when applied insures positive protection from tampering with the gas tank. It's easy to syphon gasoline from a tank. Millions of gallons are stolen by this "racket." Public and private garages, curb stones and open lots —no matter where cars are parked, they are not safe from gasoline thieves. One tank of gas costs more than an *AUTOMATIC GAS-LOK*. No car owner can afford to be without it.

No Wonder That Agents Earn

..$10 to $25 a day..

One man ordered 10 dozen after arrival of sample. Another sold 45 dozen in 30 days. Another sold 60 dozen in 60 days. It's going over in a big way. Just show car and truck owners how this patented lock prevents gasoline theft and a sale is made. Agents and salesmen can easily earn up to $25 daily on this new, practical necessity. Sell direct to car and truck owners, also at wholesale to filling stations, garages, and other dealers. Big profits.

FREE DEMONSTRATOR

Enables you to give a practical, indoor demonstration of how AUTOMATIC GAS-LOK works. Made in sizes to fit all cars. Beautiful in appearance. Will not wear or get out of order. Sells for $1.95 with two keys.

SPECIAL AGENTS OFFER!

Send $1.95 deposit for sample. This deposit will be refunded on your first order for a dozen locks. We will include demonstrating outfit FREE. Money back if not satisfied. Convince yourself that you can make big money with this new, patented item. Send today.

MAIL COUPON NOW!

AUTOMATIC GAS-LOK MFG. CO.
21 E. Van Buren St.
Dept. 25 Chicago

Automatic Gas-Lok Mfg. Co.,
21 E. Van Buren St., Dept. 25, Chicago.

Enclosed is deposit of $1.95 for sample Gas Lok and free demonstrating outfit. This deposit is to be refunded on my first order for 12 locks.

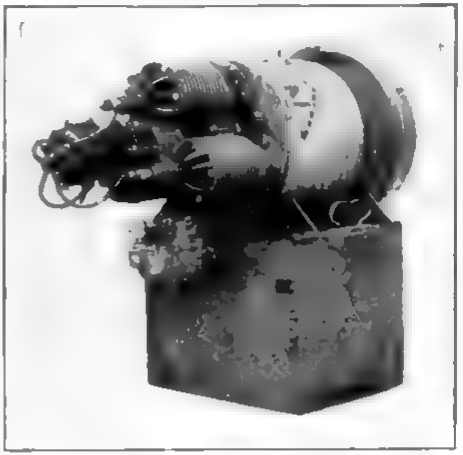
Name .. ..

Address .....

☐ SEND LITERATURE AND DETAILS

ANDY'S SHOP MAIL BOX

(Continued from page 32)



This unique wobble plate motor was built by Baldwin Kuntz, an M-M reader who is an automobile dealer in Juneau, Wis. Not much power, says Mr. Kuntz, but a whale of a lot of fun.

Let us hear from you on the boats you'd like to see run in the estimable old family almanac.

• • •

Motors become more and more popular as building projects. A few years ago everybody approached the design and building of gas engines as something of a black art. Now, with so many motor innards to look at in every vacant lot, it's a dumb school boy who doesn't have the feel of proportion of a good gas engine in his veins.

Every mail brings this old scribe some pic of a gas engine our readers have built, and one of the most interesting comes from Baldwin Kuntz, who has built an extremely interesting wobble plate motor of three cylinders.

Mr. Kuntz' letter:

Juneau, Wis.

Gentlemen:

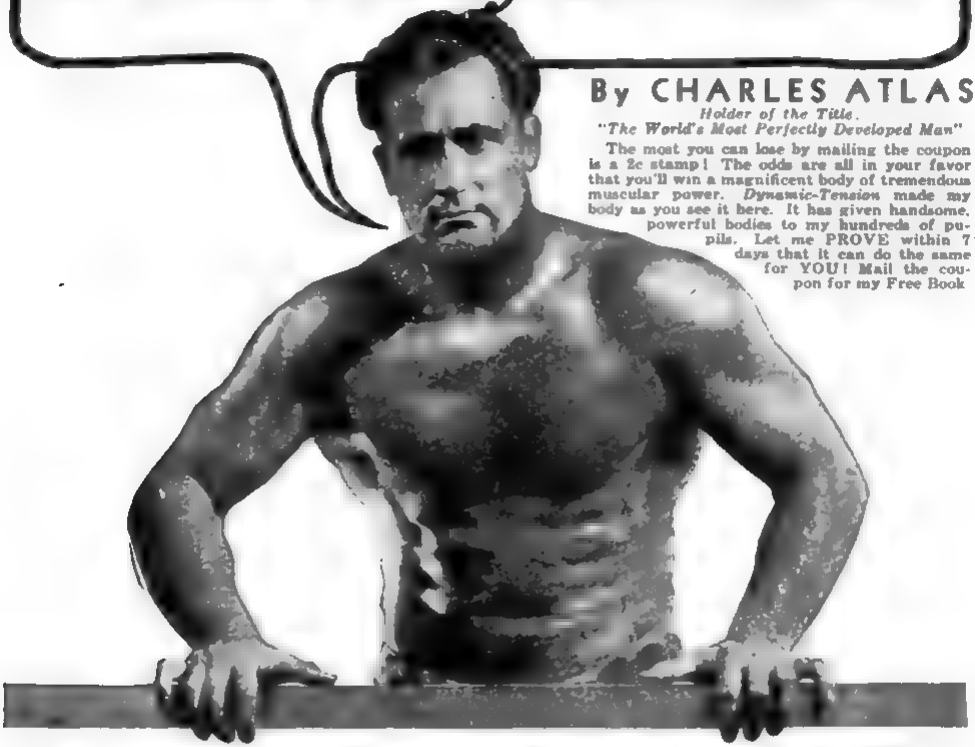
I have been a reader of your Magazine for a long time and enjoy it very much. I am sending you a couple of photos of an engine which I built in my spare time in the last two years, if they are of any interest or value to you, you are welcome to them. I do not claim much for it as a power producer, but it has served its purpose by experience I have gotten out of it and I feel that my time was well spent.

The engine is of the wobble plate type and is three cylinders, air cooled, and has a single rotary valve which serves all three cylinders for inlet as well as exhaust.

I am much interested in Freak Engines such as you described in your magazine of April 1929, page 108 and page 165. Also the Nov., 1930 issue, page 100. I would like much to know where I can buy books on all kinds of engines, especially out of the ordin-

(Continued on page 42)

Would YOU Gamble 2¢ to Win a Body like Mine?



By CHARLES ATLAS

Holder of the Title,
"The World's Most Perfectly Developed Man"

The most you can lose by mailing the coupon is a 2c stamp! The odds are all in your favor that you'll win a magnificent body of tremendous muscular power. *Dynamic-Tension* made my body as you see it here. It has given handsome, powerful bodies to my hundreds of pupils. Let me PROVE within 7 days that it can do the same for YOU! Mail the coupon for my Free Book

HOW does *your* body stack up against mine? Will you give me a chance to PROVE that my method, *Dynamic-Tension*, will do for you what it has done for me and hundreds of my pupils?

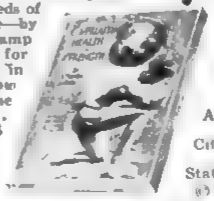
I'm so sure of what *Dynamic-Tension* can do that I can make you an Offer which other Physical Instructors don't DARE to make. I agree to show you definite results *in 7 days*, to give you conclusive PROOF *within a week* that I can transform you, too, into this NEW MAN of mighty energy and strength.

I used to weigh only 97 pounds. I was sick more than half the time. Then I discovered *Dynamic-Tension*. This system changed me from a weakling into the man who was acclaimed in two international contests as "The World's Most Perfectly Developed Man."

My *Dynamic-Tension* method works hand in hand WITH Nature. There's nothing artificial about it, no pills, special foods, or any tricky apparatus that may strain your heart and other vital organs.

FREE BOOK

Let me tell you all about it in my free book. You can win a body like mine, as my hundreds of pupils have done—by risking only a 2cstamp to mail the coupon for my free book! Fill in the coupon *right now* and send it to me personally, CHARLES ATLAS, Dept. 6-X, 133 East 23rd Street, New York City.



CHARLES ATLAS, Dept. 6-X, 133 East 23rd Street, New York City.

I want the proof that your system of Dynamic-Tension will make a New Man of me—give me a healthy, husky body and big muscle development. Send me your free book, "Everlasting Health and Strength."

Name .....
(Please print or write plainly)

Address .....

City .....

State .....

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SHOP BLUEPRINTS

for building BOATS, AIRPLANES, TRAILERS, AUTOS, etc.

Now you can build those projects you've been dreaming about—in your own workshop, at trifling cost, and with the utmost ease if you use Modern Mechanics and Inventions large-size shop blueprints! These are genuine blueprints, not cheap lithographed substitutes—real man-size prints, most of them made from the designers' original drawings. It is impossible to do more than list a few of the most popular prints on this page, but on request we'll be glad to send you free a new illustrated Blueprint Folder, giving complete descriptions and photographs of the projects. Ask for it!

BOATS

GANNET—Ford-Powered

A deservedly popular boat plan. A 24-foot cruiser, powered with Model T Ford motor, driving her at around 15 m.p.h. Uses V-bottom hull easy for amateur builder. Straight sides easy to plank. Bunks for two; plenty of room for provisions and duffle. Price of prints **$2.00**

DOROTHY—A Cruiser

Primarily a power boat, designed for cruising economy, not speed. Good for 9 miles an hour with a 10 h.p. marine motor. Ford can be used if desired. Dorothy has a sail if the motor quits. She's 24-foot, plenty of cabin room for two or more; a real deep-water performer. Prints **$2.50**

PUNKIN' SEED

A small outboard racer, extremely simple to build. Cleans up in B, C, and D classes everywhere. Strictly a speedboat—easily portable. Prints **75c**

WANDERBOAT

An outboard runabout and cabin cruiser in one, light enough to move on a trailer. Good for 22-25 m.p.h. with a large outboard motor. Canvas covering, which can be put in place in a jiffy, gives you a weather-tight cabin for overnight stops. Price of prints **$2.00**

WHIZZER—Air-Driven

A speedboat driven by an air propeller and a converted motorcycle engine of one or two lungs. Lots of fun and plenty of speed. Prints **50c**

KATUSHA—A Cruiser

Here's a big little 19-foot cruiser with a big double bunk and stern cabin. You can build her for about $100. Ultra modern, with stern drive engine. About the right size to tow on a big trailer for parts unknown and real adventure. Price of prints **$2.00**

WINK—A Race Boat

Here's a 125 cu. in. race job, over a dozen of which have been built. It is really an inboard motored hydroplane in the outboard nine class. Plenty of speed, 40 miles an hour and not hard to build. Very pretty. Prints .. **$2.00**

TUBBY—A Sailing Scow

A 12-foot sailing scow, just the thing for boating fans looking for something simple to construct. Flat-bottomed, with leeboards—the acme of simplicity to build. Your choice of two sail plans—you can use her as a rowboat, too. Price of prints **$1.25**

CANVAS CANOE

The simplest type for the amateur builder. Blueprints give all dimensions for a job you'll be proud of. Price of prints, postpaid **75c**

BUDDY—18 Ft. Single-hander

Designed by Sam Rabl, embodying the ultimate in small single-handed sailing cruisers. Accommodates two with comfort on long cruises. Has 5 h.p. inboard motor, also provision for radio installation. Blueprints are amazingly complete and detailed. Price of prints, postpaid **$4.00**

BOUNCER—A Fish Class Catboat

A 15-footer designed by Warren Hastings Miller. He built his for less than $40, including sail. A fast racing catboat for lake and harbor sailing. Price of prints **$1.00**

OLYMPIC MONOTYPE—Centerboard Catboat

A 12-foot V-Bottom centerboard catboat unsurpassed for light to medium weather sailing. Officially designed for Olympic games competition by Edson B. Schock—blueprints are from his original drawings and cost, postpaid **$3.00**

LIGHT AIRPLANES

PIETENPOL AIR CAMPER

The country's most popular home built plane. Carries two passengers, powered with Model A Ford motor. High wing monoplane. Cost of construction, including motor, well under $500. Blueprints show both wood and steel tube fuselages, and give motor conversion details. Hundreds of these prints have been sold with complete satisfaction. Price of prints.... **$7.50**

PIETENPOL SKY SCOUT

A mate to the Air Camper. Single place, powered with Model T Ford motor. Cruising speed, around 75 m.p.h. The most satisfactory light plane with this type of motor. Price of blueprints **$4.00**

AUTOS—TRAILERS

CAMPING HOUSE-TRAILER

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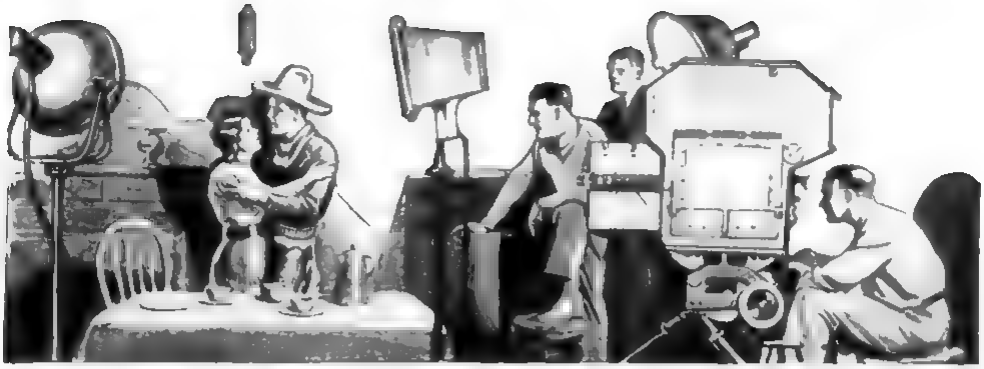

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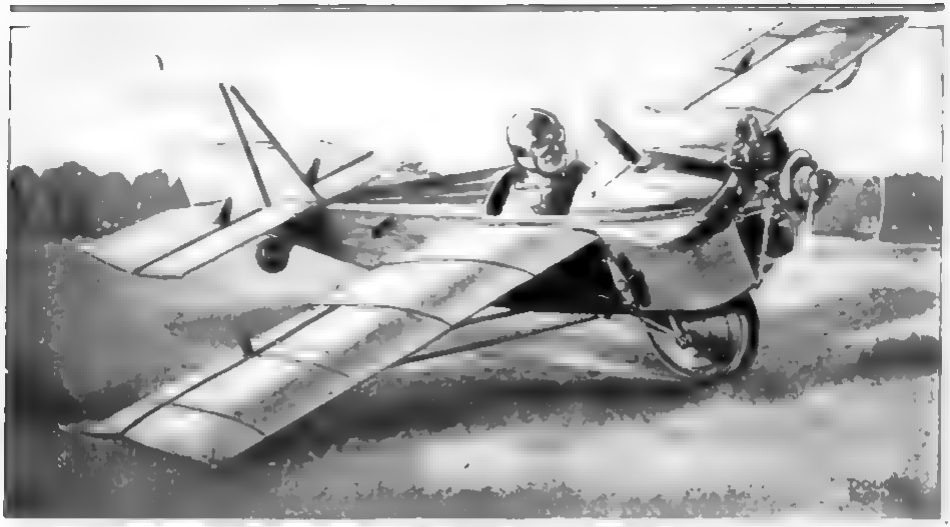

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YOU'VE been waiting patiently for it for months—and here it is, bigger and better than ever—by long odds the most up-to-the-minute and practically valuable edition of the Flying and Glider Manual ever published. The Penguin Practice Plane, shown at the top of this page, teaches the art of flying and supplies most of the thrills without leaving the ground. Plans for it appear complete in the 1932 Manual, as well as plans for a Ford-Powered monoplane carrying two passengers, which you can build for less than $500—and there are a dozen other plans in the volume.

Nowhere else will you find plans like these—authoritative, complete, lavishly illustrated with photographs and working drawings which make it easy to build your own airplane. Pick any one of the half dozen ships in the Manual and start to build it from the plans in the book—all you'll need will be tools, materials and a workshop; the Manual supplies everything you need in the way of plans and instructions. No use delaying—get your copy NOW!

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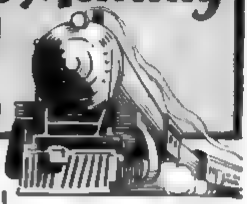

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Just think of it—a complete plane ready to assemble, eligible for Department of Commerce License for only $399.00 (less motor). This price is made possible by large scale production methods. But you need only $16.00 for your first group of parts. Order balance as desired and pay as shipped. Build as fast or slow as you like. Fuselage, tail, rudder, elevator and stabilizer come completely welded. Ribs built complete at the factory. All you have to do is assemble the units and cover your plane.

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Heaths have won in National Air Races for the last six years and hold the world's altitude record for light planes 17,907 ft.

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ANDY'S SHOP MAIL BOX

(Continued from page 36)

ary kinds and including Diesel engines.

If you can tell me where such books can be secured I will be highly pleased.

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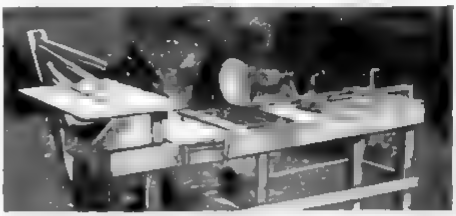

C. Clarence Holden, of the Skilark Aircraft Co., Fort Worth, Texas, sends us this shot of his "Extemporaneous" wood working shop. It is cleverly built from old parts.

Here's a shot and a letter about a home woodworking machine, home built.

Fort Worth, Texas

Dear Andy:

Inclosed you will find a woodworking machine of my own design. It is not as pretty as your shop equipment shown in the manual but it will do the work and can be built for less than $20, including motor.

Jig saw has a three foot swing under arm with tilting table and is worked by a pitman from the main shaft underneath. Circle saw is on an emery wheel mandrel and has an elevating table for wobble saw or depth cutting. The sander is made with two pieces of 12 inch board with grain crossed and nailed and glued shaft to it is of 1 inch tubing and must be balanced. Just cut a hole in the center of a tomato can, slip on for pulley and solder.

For lathe head use a small emery wheel mandrel with emery wheel mounted and on the end have a chuck to carry drills and the center for lathe. Lathe head is of 1 inch tubing. Sliding rest is of the same material. Take two pieces about 4 inches long, split down the center and slide over head tubes. Do the same for tail stock. Just make the center on the upright of tail stock to come in line with chuck.

The main shaft is of 1⅛" tubing and should run the whole length of frame. Put hangers on bottom cross members and belts running to each individual machine.

You can do any kind of work around the shop or farm with this little machine and it is easy to build and costs very little to run. Will send you the blue print of this if you want to publish them, or will send 5/7 print to any of the boys for a dime in stamps.

Yours for pleasant set downs,

C. CLARENCE HOLDER.

GET INTO Aviation NOW

Experts Predict New Wave of Prosperity

There's no time to waste! All indications point to a spectacular new "boom" in aviation. Men high in aviation circles are preparing for it *now*. Clarence M Young, Assistant Secretary of Commerce in charge of Aeronautics told President Hoover that "there appears smooth sailing ahead for the industry" and that it "shall be of mighty importance in restoring business stability and prosperity to our nation. The result will be added returns for aircraft builders and manufacturers of accessories used in airplanes."

Don't Miss This Golden Opportunity!

Naturally, this huge expansion program will create a demand for man power. Will you be ready to step into a big fine aviation job when the call comes? *You will be if you prepare NOW!* And it's so easy. In a few short months you can easily master every principle of Ground Training and be ready to step into the aviation job you long for.

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Our practical Home Training Course offers the quick, sure way to get into this fascinating business. You don't need any previous knowledge of aviation or any special training or schooling. Our method of training is so simple and easily understood that anyone can master it quickly.

Just give us an hour a day and before you know it you will be ready to step into any of the 40 Ground Jobs that aviation offers *and that we will help you get. But don't wait till the boom is here to get your training.* The big money in aviation goes only to *TRAINED MEN.* And unless you can qualify as an expert the next era of prosperity in aviation will sweep past you and leave you just where you are today.

ACT TODAY!

So don't miss this golden opportunity. If you do you may regret it all your life. Send for our big Free Aviation Book today and get all the facts. No cost or obligation. Do this now while there's still time.

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Joe. D. Vail, President
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Dear Sir: I'd sure like to be prepared when the next boom in aviation arrives. Please rush your big Free Aviation book and your tuition and employment offer. I am ..... years old.

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Mechanical TREASURE

Seismograph equipment being ferried across the Magdalena river in South America. It may locate a rich ore field.

Composition of the earth far below the surface is laid bare by the seismograph, which records the shock passing through the ground from a dynamite explosion. Study of speed and character of the vibrations enables prospector to tell if there is any possibility of ore underground.

The modern treasure hunter, whether he seeks buried gold, new ore fields, precious stones or development concessions, carries with him into the field the latest devices of science to help him in his work. Seismograph, submarine sleds and other ingenious machines invented for special purposes, even ordinary camera films, are now used to win riches. This fascinating article explains methods of up-to-date treasure hunting.

IT'S a dangerous game, concession hunting, and the men who play it don't always come back. Replacing brute force with diplomacy, utilizing the latest offerings of the scientific world to overcome handicaps that have proven the despair of others, the concession hunters of today are behind the front page news of tomorrow.

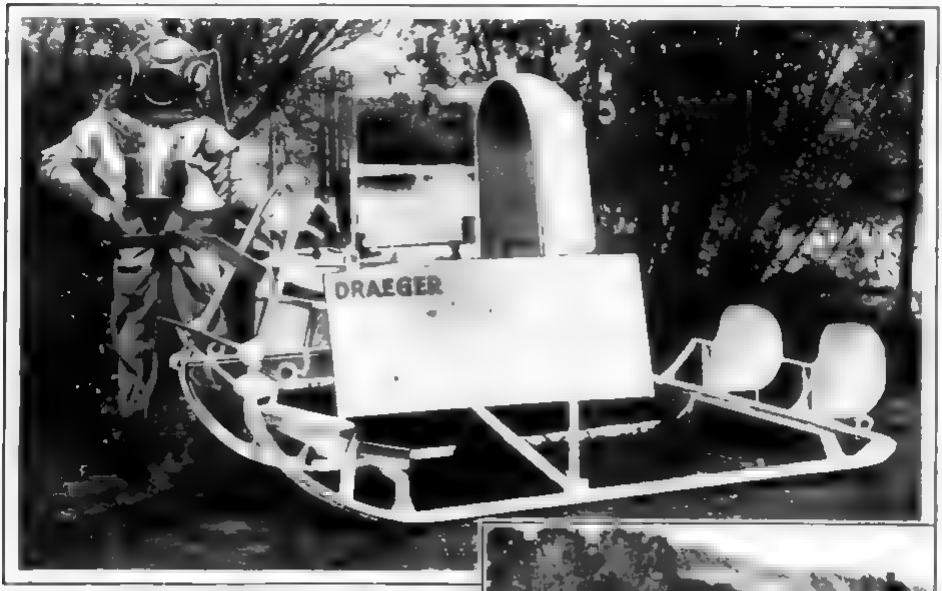
A concession hunter, be it known, is just another name for a treasure hunter. It may be gold buried by the Incas, it may be the riches of ore or gem fields, the lure of petroleum or the wealth of railroad or water power rights, but somewhere in the background you will inevitably find some sort of treasure luring on the hunter.

If he is the emissary of Big Business, he is equipped with the latest means of transportation and the most modern scientific instruments. If he has no wealthy syndicate behind him, he may have to struggle along with the most meager equipment and the most primitive transportation.

Packing the machinery of progress and the scientific instruments of missionary work into dangerous and difficult country is but one of the everyday jobs of the concession hunter. Robert Palmer, an "engineer" of the Gulf Refining Company who recently left for a three years' trip into the interior of Colombia, packed with him a seismograph outfit weighing well over a

HUNTING *With Science's Latest Aids*

by E. C. SCHNURMACHER



Concessions to search sunken ships have been sought from the Spanish Main to the coast of France. Above is shown the Draeger submarine sledge developed for such work, upon which the diver is towed over the ocean floor.

thousand pounds. With this seismograph, his dynamite and his radio set, he can accomplish in one day, work that would take the ordinary prospector weeks.

"But," he told this writer, "the ordinary prospector can cover ground much more rapidly than I can. The working of my apparatus is simple compared to its transportation through the Colombian bush. I tried using mules but they jarred the delicate tubes and apparatus. The load is now carried by Indian women who are much better adapted for this sort of work than the men."

Radio "Divining Rods"

By having his dynamite planted in the ground, and then discharging it by means of radio, Mr. Palmer can determine over a large area what the subsoil contains by the seismograph which records the velocity of the shock resulting from the explosion. Radio is used to fire the charge in order to eliminate the time and trouble of stringing miles of wires. This is but one example of the thoroughly modern types of "divining rods" which science has placed in the hands of the concessionaire.

Precious stones and ores, ivory and rubber, copra and water power. These are the things sought by treasure hunters the world over. And in the van of them all, is the quest for gold. It is popularly believed that

An absurdly simple yet scientifically accurate method of locating radium ore is here shown. Film rolls are strewn on the ground; if, when developed, they show light streaks on the negatives, the presence of radium is proved.

the gold resources of the world have been thoroughly explored and the discovery of new large fields is unlikely. The entire gold production of Canada last year was some sixty million dollars worth and in this she was exceeded only by Africa. Yet these are piker figures, compared to what may await the successful concessionaire.

The famed El Dorado treasure, eagerly sought by treasure hunters for hundreds of years was located and nearly obtained by a treasure hunter from Lake Guatavita, a few miles from Bogota, the capital of Colombia. After lying undisturbed at the bottom of the lake for 360 years, this enormous treasure, which comprised fifty mule loads of gold dust and incalculable amounts of

gold, platinum and jewels, was methodically sought for by a British company.

Old records found by the treasure hunter, Phillips, proved that the lake had been used as a repository for the gold and precious jewels of the Incas, not only as offerings to their gods, but also as a safeguard against the greedy Spaniards. Hernando Quesado had at one time attempted to drain the lake and several years after that, Antonio de Sepulveda, another questing Spaniard, had succeeded in taking over a quarter of a million dollars in gold and precious stones from the lake. Countless millions remained, however, in the lake, basined by an extinct volcano whose peak rises several hundred feet above the surrounding terrain.

Mud That Turns to Concrete

Phillips figured that present day ingenuity would succeed where the crude methods of the sixteenth and seventeenth centuries had failed. As the lake was but a thousand feet in diameter, he thought that it would be a comparatively easy matter to drain it by boring a hole in the side of the volcano. This was done by drilling a 1100-foot shaft.

The water began to rush out through the sluice and when the treasure hunter all but considered himself a billionaire, the muddy bottom of the lake began to appear, becoming hard as concrete as it was exposed to the air and blocking the shaftway so laboriously dug. The concession hunter found that it formed a substance impossible to penetrate with the means at hand and, with his resources exhausted, he was forced to give up the project which may or may not yield millions to the next concession hunter who obtains the right to seek the treasure.

Colombia, this most northern country of South America, has a great many concessions, British, American, German and Canadian pouring hundreds of thousands of dollars into her treasury. A goal for treasure hunters, because she contains more natural undeveloped resources than any other country, as well as millions in buried treasure, she still cherishes a dogged resentment against the United States for taking one of the greatest of all concessions—the Panama Canal.

Of what stuff is a concession hunter made? He may be the soldier of fortune type, as was General Lee Christmas whose name is still a byword for bravery throughout Central America. He may be an engin-

An attempt to recover Inca gold from lake bottom by drainage was unsuccessful when exposed mud became as hard as concrete.

Fortunes are frequently found in undeveloped country, which means that the treasure-hunting prospector must have transportation for his ore or other product. Often primitive labor must be used in railway construction, as in this instance where the Gold Coast railway, West Africa, is shown being built. Railway concessions are often very valuable.

eer of the type of Gilbert La Bine whose recent discovery of radium deposits in Canada promises to break the monopoly of the Belgian Congo. He may be of the inventive type as is Simon Lake who obtained the concession to explore the sunken *Lusitania*. Or he may simply be a young man of adventurous spirit whose accomplishments are all before him.

Riches in Water Rights

Of the many concession hunters who have played a lone hand with no syndicate backing, Claude S. Young, the man who conquered the Rio Grande Canyons to file a water rights concession, is typical. So dangerous and seemingly impossible was the trip he took, that even his fellow Texans doubted his veracity until he produced photographic evidence of his journey.

He was convinced that if he could penetrate the Santa Helena Canyon of the Rio Grande River, some hundred odd miles away from the nearest rail point across the trackless Terlingua Desert and desolate Chisos (Ghost) Mountains, he would be able to file a claim to a valuable water rights concession from Mexico and the United States —a concession that would mean exceedingly valuable hydro electric and irrigation rights to the possessor.

Dangers of the Canyon

"The expedition itself I finally made in a specially constructed little outboard boat which I used to explore, map and measure the great Santa Helena Canyon," he told the writer. "It was a dangerous trip, but well worth the danger when I finally filed my claim. The Canyon is one of the deepest known, considering its proportions. The walls rise in perpendicular height a sheer sixteen hundred or two thousand feet above the narrow, twisting river, in places less than one hundred feet wide of swift rushing water. There is no landing for miles and the walls, at the waterline, are either perpendicular and smooth as glass, or undercut by the current."

Boat Made to Special Design

Young constructed a special 15-foot outboard boat to navigate this river. Made of 22-gauge galvanized iron and built on the Norwegian Pram style, she contained four air tanks and became another ingenious device by which a treasure hunter achieved success. These devices, such as the Draeger submarine sledge, the Lake sea stairway, and the McCullom exploration seismograph used by Palmer are prominent examples of

A modern divining rod—electrical apparatus of a St. Louis inventor who claims that with it he can detect the presence of gold.

Thanks to hydraulic mining, comparatively poor gold sands can be worked at a profit. Imagine the task of digging this Alaskan gold-bearing soil and washing out the yellow metal in a miner's pan. The soil is mostly frozen muck.

Giant Sharks Guard Riches of Old Port Royal, Which Sank in Quake

If you can figure out some means of discouraging the giant sharks which infest the waters, you can perhaps salvage your treasure from the pirate stronghold of old Port Royal, which sank under the waters in foreground during a quake.

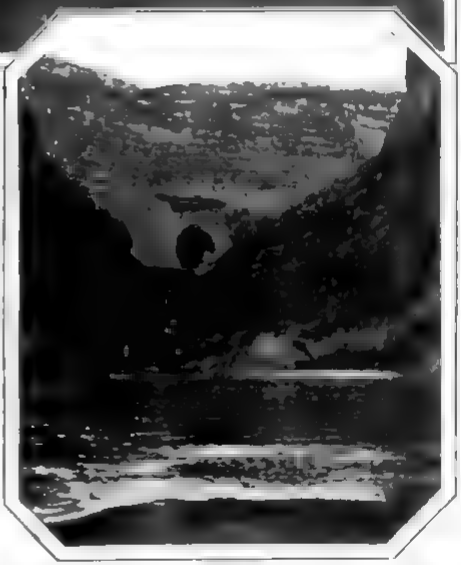
the scientific methods employed by the modern concession hunter.

Scientifically accurate and yet absurdly simple is the device used by concession hunters in the Canadian Northwest to discover ground containing pitchblende, the ore from which radium is extracted. They scatter rolls of film over the area which they believe contains the pitchblende. Then they develop the rolls. If the ground does contain pitchblende, its radioactivity will be recorded on the negative, in spite of the paper around the film. Evidence of the radioactivity will take the form of light streaks on the negative.

Stumbling Over Radium Treasure

So it is that Gilbert La Bine, a Canadian mining engineer and concession hunter who recently discovered a deposit of radium ore in the unexplored Canadian wilderness near the Arctic Ocean, may in time be regarded as a benefactor to all mankind. For the radium concession he staked 800 miles from the nearest railroad in the bleak sub-arctic, promises to eclipse in value of radium content, the radium ores being obtained from the Belgian Congo which is converted into radium worth about $70,000 a gram.

The finding of the radium deposit was quite by accident. La Bine, interested in the Great Bear Lake country, thought that he might find precious ore of some kind there. He hoped to stake out a gold concession and he persuaded Leigh Brintnell, chief of the Western Canada Airways, to pilot him. He discovered a large vein of quartz on the eastern shore of the lake, staked a claim and returned to civilization



Treasure-hunters sometimes stumble on important scientific discoveries. This prehistoric cave-dwelling was found by Lt. Young, first man to explore the headwaters of Rio Grande.

to put through his concession with the government, hoping that the staked area contained gold.

The following February in the midst of the severest weather in the Northwest Territory, he flew back to his claim and after prospecting on snowshoes for over four months without finding gold, he did find a blackish rock that turned out to be high class radium ore. Since that time, two years ago when he first secured his concession and realized that he had found radium, there has been a rush of treasure hunters to this territory.

In more civilized countries, concessions sometimes require prolonged negotiations with governments and with individuals,

who demand either a large sum outright or a considerable percentage of what the treasure hunter obtains.

An example of the latter case is to be found in the wreck of the *Florencia*, the richest galleon of the Spanish Armada that has lain at the bottom of Tobermory Bay off the Coast of Scotland for the past 344 years. This craft from which Simon Lake may attempt to retrieve the treasure of more than $12,000,000 with his sea staircase, illustrated in the February MODERN MECHANICS AND INVENTIONS, after he has had a try at the *Lusitania*, belongs not to the English Crown, but to the Duke of Argyll, who alone has the power to grant a concession.

Spanish Ship Still Holds Treasure

The English Crown has no interest in the treasure of the wreck because Charles the First sold the "Spanish Wrackship" to the then Duke of Argyll. Since that time to this, the Argyll family has vainly tried to recover the treasure and, having failed, has leased the right to try to a long line of concession hunters whose methods have improved through the centuries.

One of the very first concession hunters to try for this treasure was John Stearns, a Yorkshireman who with the Argyll family's permission, rowed about Tobermory Bay with a hawthorn stick which failed to point the way to the treasure. One of the last concession hunters to try for the treasure which still reposes in the *Florencia*, was the owner of a powerful salvage ship, the *Breamer*, who vainly tried to remove the treasure with powerful hydraulic pumps.

Not all concession hunters have such difficulty, however. A few years ago, a couple of descendants of Spanish soldiers who over four hundred years ago were stationed at the Fort San Felipe in Cartagena, Colombia, appeared at the fort with an ancient map. Entering the fort, which was open for sightseeing, they walked down one of the several dark corridors, and guided

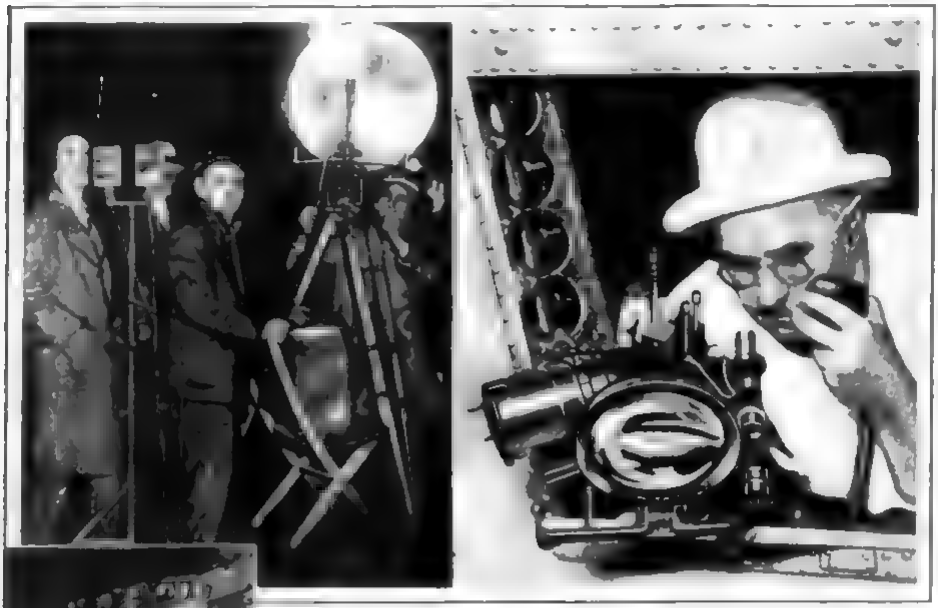
(Continued on page 166)

From this underground passage of Fort San Felipe, two descendants of soldiers once stationed there dug out an enormous treasure.

Fashions sometimes turn new products into money. Snake skin for women's shoes has come into popularity during the past fourteen or fifteen years.

Oil does not necessarily come from man-drilled wells. This photograph shows the Barco concession in Colombia. It is one of the largest natural seepages of high-grade petroleum in the world. No expense for well-drilling here.

Dirigible Sends Program on Light Beam



In photo at right above is seen Mr. Taylor speaking in mike which modulated light waves on beam from the Los Angeles. At left are shown engineers on roof of Schenectady building picking up beam with photo-electric cell mounted in parabolic mirror.

This drawing depicts the manner in which the feat of "narrowcasting" over a light beam was performed. Aboard the Los Angeles, John B Taylor, inventor of the system, spoke into mike which modulated rays of light through special amplifier Beam was intercepted by electric eye in parabolic mirror.

WHO WOULD believe that a light beam could be persuaded to convey a radio program? Yet such a feat was recently performed when the U. S. Navy airship *Los Angeles* flew over a Schenectady, N. Y., building, shot a shaft of light earthward, and actually talked over the beam to engineers on the ground.

The feat was performed to inaugurate the opening of WGY'S new low-wave station. Aboard the ship was John B. Taylor, inventor of light-beam broadcasting, or "narrowcasting," as it is more aptly called. The mike into which he spoke was hooked to a powerful light, the source of the beam, which was modulated by vibrations of the voice waves with a special amplifier.

The beam was intercepted on the roof of the building by a sensitive photo-electric cell mounted at the focal point a special parabolic mirror reflector. By means of this electric eye the modulated light waves were transformed back into sound waves, which were then put on the air over WGY's short wave station.

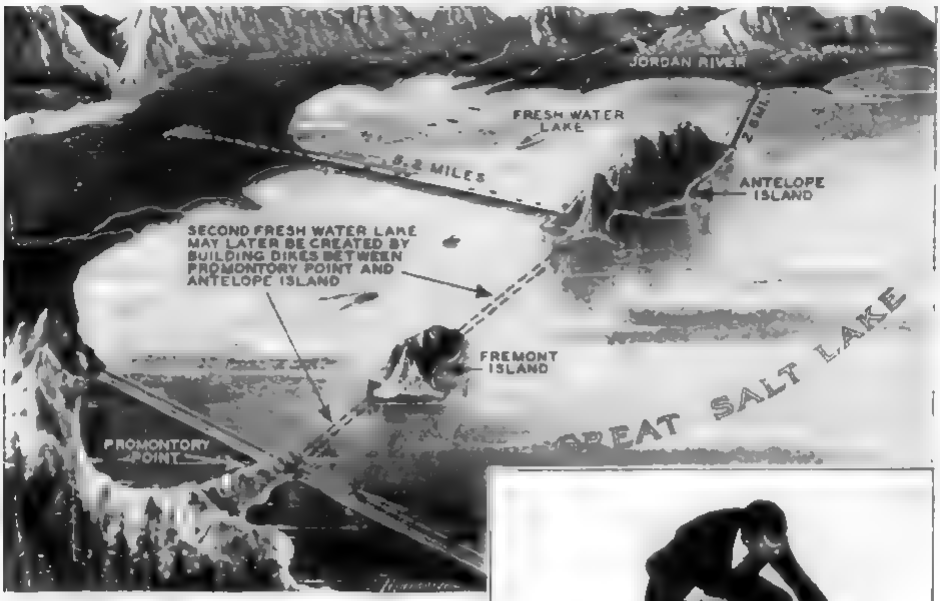
"Narrowcasting" is expected to prove of great advantage where secrecy is desired, since messages can be picked up only at the point at which the beam is directed.

Gold Fever of Prospectors Threatens Business

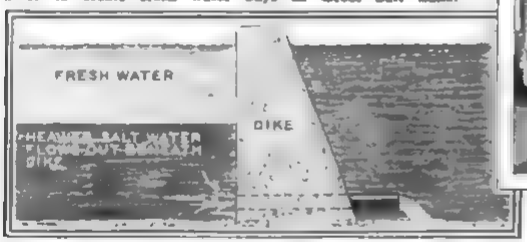
BECAUSE prospectors scoured the gold country too thoroughly and ardently and neglected the less precious metals, the business of the future may suffer rather severe restrictions on monetary circulation, is the belief of a distinguished Swedish economist.

So long as business makes use of the gold as its standard of money and value, there is an annual need of an increase of about three per cent in the amount of gold in the world. Until the last twenty years this demand was met by new discoveries of metal, which now seems to be almost exhausted.

"UNSALTING" *the* GREAT *Salt* LAKE



Drawing shows how fresh waters would be impounded by dikes to create fresh water bays in Great Salt Lake.



Apparatus used to test principle shown in drawing at left, in which light fresh water floats on top of salt water, forcing latter out through bottom of dike.

AFTER ages of uselessness except as an attraction for tourists and a source of table salt, the Great Salt Lake of Utah is at last destined to be put to work when a remarkable "unsalting" project now under consideration is carried to completion.

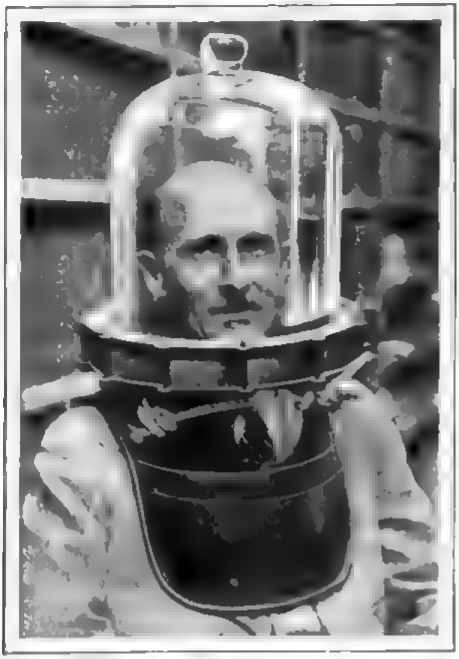
As shown in the illustration above, plans call for the construction of two dikes leading from the mainland to opposite ends of Antelope Island, impounding a section of the lake which will be gradually freshened by inflow of water from the Jordan river. The proposal is no idle dream, being backed by members of the Utah water storage commission and many leading citizens of Salt Lake City.

To prove the feasibility of the displacement method which will be used to unsalt the lake, the apparatus shown in the above photograph was constructed, and is shown being demonstrated by W. R. Wallace, chairman of the Utah water storage commission. The bottom of the pan is filled with salt water; fresh water flows in from the inverted glass bottle, and floats on top of the salt water because of its lighter weight. The heavier salt water flows out the tube to which Mr. Wallace is pointing, which is bent upward at the end to create a head of water which would exist in the lake under natural conditions.

In this way, salt water is displaced much more rapidly than would be the case if fresh water were merely permitted to mix itself with the brine. Therefore the dikes, when constructed, will have tunnels at the bottom so that the salt water can flow out into the main lake under pressure of the fresh water above.

The purpose of unsalting the lake is to make its waters suitable for power use. Water is a necessity for power development, but it must be fresh—the 20% to 30% saline content of Salt Lake would ruin boilers in a short time.

Beebe to Study Undersea Life in Glass-topped Helmet



Dr. William Beebe, famous zoologist and explorer, wearing the glass-topped diving helmet which he will employ in studying marine life around island of Bermuda this summer.

DR. William Beebe, the famous author, explorer and scientist, who last year penetrated the ocean's depths to the distance of a quarter of a mile in his steel "bathasphere," is now planning another assault on the secrets of the sea's bottoms.

The region which he will explore this year, on his third expedition, lies in the vicinity of Bermuda, which harbors the most amazing creatures of the undersea. To get a glimpse of these fantastic creatures, Dr. Beebe will carry some unusual pieces of equipment, among which is the glass-topped diving helmet shown in the accompanying photo. Resembling a bell jar used to preserve food delicacies on a restaurant counter, the helmet will be employed for study of marine life at only moderate depths.

Dr. Beebe hopes to reach a depth of half a mile in other diving equipment.

How Overalls Cause Skin Disease

OVERALLS and other working clothes that come in contact day after day with the skin of the wearer, especially the skin of the knees and lower legs, are condemned as causes of troublesome skin diseases by medical authorities.

In warm weather, when the danger of skin troubles is greatest, underwear may be left off and the overalls worn next to the skin. Even though the legs are washed thoroughly at the end of each day's work, the skin has been in contact all day with the dirty cloth, often containing irritating oils, sharp particles of dirt or metal or other materials which may cause skin disorders.

"Innocent" Cats Really Dangerous

A TAX on cats, not to help balance the budget but to reduce the excessive numbers of these animals now regarded as a real menace to human health and property, is suggested editorially by the weekly Journal of the American Medical Association.

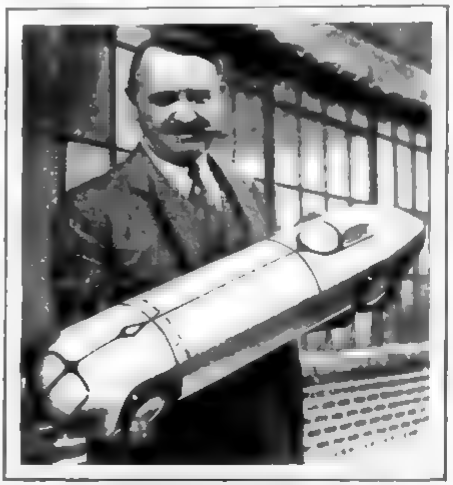
Rat bite fever is one disease, the editors state, which may be caused by germs in the bite of a cat. At least two kinds of tapeworm live in cats and may be transmitted to human beings. The germ of the serious disease called undulant fever is another which has been found living in innocent-looking Tabbies and Thomases.

Oldfield Car Seeks Speed Title

BARNEY OLDFIELD, veteran speed king, thinks that automobile speed records have remained long enough in alien hands, and is now laying plans to bring back the world's record to the United States, where he thinks it belongs.

By way of realizing his plans Oldfield is designing a car which he believes will outspeed the Bluebird of Malcolm Campbell, present title holder, by some 100 miles per hour, hitting off the terrific clip of six miles per minute.

A model of the car is shown below. The completed car will weigh 6,500 lbs. with the motor, and its overall length will be 24 feet, 6 inches. The racer will get its cyclonic speed from a 3000-horsepower motor having 24 cylinders in three banks, with 4 magnetos and 4 valves per cylinder.



Here is Barney Oldfield with model of the speed car which he hopes will break world record. Note streamlining.

Akron Launches PLANE in FLIGHT

Here is the tiny spider plane suspended from Akron trapeze ready for launching. Pilot disengages hook for take off.

IN TEST maneuvers conducted recently near Lakehurst, N. J., the giant airship "Akron" successfully launched a tiny spider plane from an opening in its underside, and then picked the diminutive craft up again on the wing, so to speak.

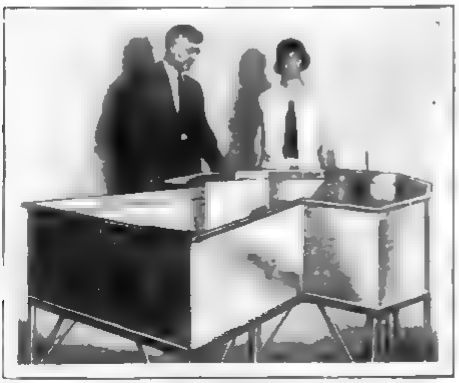
The chief piece of mechanism responsible for this feat was the retractible trapeze built onto the belly of the Akron. Planes from the hanger up inside the ship are lowered into the air from this trapeze, and then disengaged to maneuver about to protect the mother ship.

When the little spider plane has completed its flight, it flies back under the belly of the Akron, hooks onto the trapeze, as demonstrated in the accompanying photo, and is then raised up again into the hanger.

The planes carry a special framework on the top of the wing to hook on dirigible.

Launching mechanism is shown in this photo looking aft.

Patients Suffering From Arthritis "Float" Back to Health in This Tank



For arthritis treatment, patient floats in this special tank, head being supported by clamp-like pillows as [illegible]

PERSONS suffering from arthritis may now literally float back to health, thanks to a new method of treatment involving a tank shaped something like a form-fit coffin, as shown in the photo at the left.

This tank is of the portable type such as is used in hospitals which have no large pools for hydrogymnastic therapy. The patient undergoing treatment floats in the water, his head being supported by a clamp-like pillow. In addition to serving as an excellent method of treating arthritis, the tank may be employed in underwater massage for recovery from physical injuries.

It was at a demonstration before the American Medical Association meeting held recently in New Orleans that the tank made its first appearance. Governor Roosevelt, eminent chieftain in the Democratic party, has been taking treatments of the type given in this tank.

Putting Nature's Power

Several methods of harnessing the tremendous energy of ocean waves have been proposed. At the left is shown Erich Roeder with a model of his motor, comprised of a circular base with an upright pillar in its center, to which are connected levers operating a generator. Six hemispherical floats, moved up and down by waves, are expected to drive the generator.

Upward of 40,000 inventions a year are granted patents by Uncle Sam, but not one of these offers a practical solution of the problem which scientists agree is the most pressing of them all—that is, how to harness natural sources of energy for power. Mr. Cole does not profess to have solved the problem, but the methods he describes here point out the trend of probable development.

WHAT is the most needed invention? Not television—not new kinds of airplanes—not speedier automobiles. Men of science are agreed that what the world needs most is a motor which converts the sun's rays and other forms of natural energy into usable power. Orville Wright, Lee De Forest, Elihu Thomson, and other leading scientists are among those who proclaim the need for a new motor.

There are two sources of inexhaustible energy which at once occur to the inventor—wave or tidal power, and solar rays. A Los Angeles inventor has developed a wave motor—an "inertia" motor, he calls it—which gives promise of being developed into a practical commercial project.

Scores of so-called "wave motors" have been built in the past, but none has proved a conspicuous success commercially. Usually the initial erection cost and the maintenance cost has been out of proportion to the results obtained. And, too, the force of a storm has been underestimated, and the first severe gale completely wrecks the machine.

The new "inertia motor" is absolutely storm-proof—in fact it could outride a tidal wave. And, too, it is the acme of simplicity—it requires no foundation, and has no

to WORK

Methods of Harnessing Natural Energy Described *by* DICK COLE

Principle of the inertia motor, operated by wave motion, is explained by the drawing at the right. When a wave lifts the hollow sphere, the massive weight inside, because of its inertia, resists the movement and exerts terrific pressure in lower cylinder, forcing oil through tube to operate generator through a turbine. Current is conducted to shore by cable.

connection with the ocean bottom except by its anchor chains.

A study of the accompanying diagrams makes it clear how the inertia motor operates. If you are mechanically minded, you will be impressed. The application of the name "inertia" will be obvious. When a wave starts to lift the hollow sphere, the massive weight inside, *because of its inertia,* resists the movement and exerts terrific pressure in the lower cylinder. Finally the inertia of the weight is overcome. Then it possesses momentum. When the sphere reaches the crest of a wave, the combined effort of the momentum and the recoil of the huge, semi-elliptic springs exerts an equal pressure in the upper cylinder. The tremendous pressure is applied to oil, which, in turn, operates a special turbine which runs a generator. The current is conducted to the shore by submarine cable.

The idea seems wholly practical. It is readily conceivable that a battery of "inertia motors" could be built into an elongated float set parallel with the wave movement, and power in unlimited quantities would be available.

The cost of building these motors would not be excessive—the maintenance cost is almost nil—the storm hazard is eliminated. Collision is the greatest hazard, but this is hardly worth considering as the float would have "running lights" at night.

A conservative estimate of the cost of the complete installation, except batteries, indicates that the value of the current generated, at 5c K.W. hour, would equal the installation cost in 18 months.

The power available from ocean waves

Inch Layer of Water Heated by Sun Generates Steam in Vacuum Boiler

This power plant derives its energy from the sun. Water in the large tank is circulated through a space one inch deep, underneath a black painted copper plate which absorbs sun's rays and heats the water. Steam is generated in a vacuum boiler immersed in this hot water, and low pressure steam turbine runs electric generator.

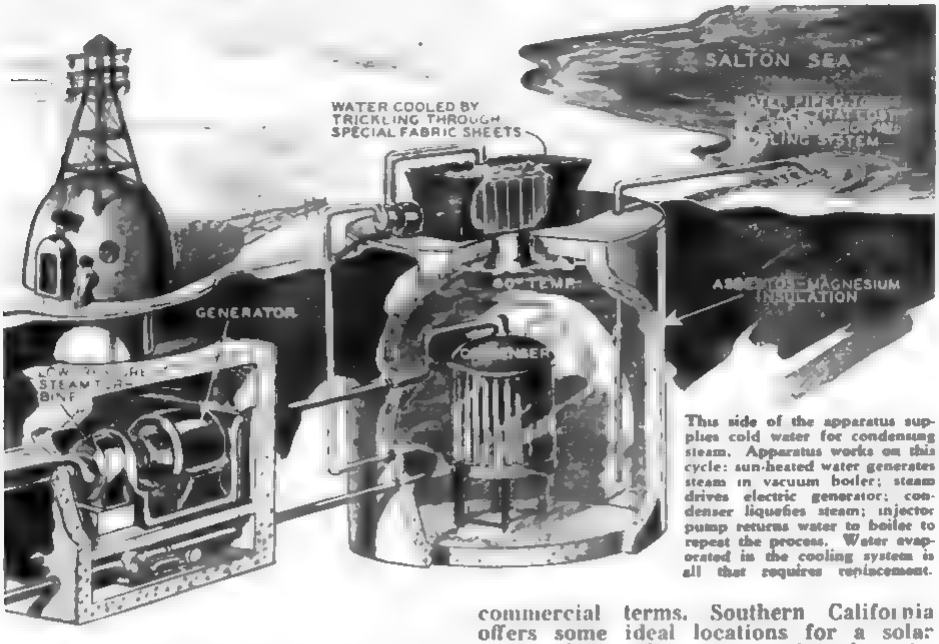
is unbelievably huge. Suppose a wave comes along and lifts a 25,000-ton ocean liner 10 feet in 5 seconds. How much power is expended? The 25,000 tons is equivalent to 50,000,000 pounds, which, raised 10 feet, represents 500,000,000 foot pounds. Since this work is performed in 5 seconds, the amount done in one minute would be six billion foot pounds. One horsepower is that required to perform 33,000 foot pounds per minute, so simple division gives the wave's horsepower as 181,818!

Every day in the year the sun is dissipating incalculable, immeasureable energy upon this earth of ours, energy which can be brought directly under control for immediate use, instead of waiting for a new geological era to make it available. The trapping and utilization of solar energy is not new—"solar engines" have been built before—but direct, commercial application of solar energy for power conversion has not been achieved.

An idea for a sun-power plant, illustrated in these pages, seems to be in a fair way to achieving success.

A drawing shows the theoretical working of the solar power plant. One side of the unit is a tank containing water, heat insulated on all sides. On top of the tank is a shallow basin of greater area than the cross-section of the tank itself. This basin is covered with a layer of sheet copper providing a space of about one inch within the basin. Water from the tank enters the basin at the center point and spreads out to the rim where it is returned to the tank.

The top of the copper covering is painted flat black. Obviously when this tank is exposed to the glaring sun, the black surface absorbs the heat which is communicated to the water in the shallow basin. The entire mass of water is sealed from the atmosphere, and evaporation, which would tend to cool the water, is prevented. The thin layer of water becomes very hot and is carried into the main tank. The circulation goes on and on, constantly building up the temperature in the main tank. The heat in-



This side of the apparatus supplies cold water for condensing steam. Apparatus works on this cycle: sun-heated water generates steam in vacuum boiler; steam drives electric generator; condenser liquefies steam; injector pump returns water to boiler to repeat the process. Water evaporated in the cooling system is all that requires replacement.

sulation prevents radiation losses. In a working model, the temperature was built up to 180 degrees.

We have now established a mass of hot water. Now for the cold element. The tank at the right is the same volume and is insulated the same as the "hot" tank. In this case the water is circulated to an evaporation cooling system. This consists of a shallow upper tank from which are suspended many sheets of a special flax fabric such as desert water bags are made of. The water trickles down these. This cooling system will maintain the temperature of about 60 degrees in the cooling tank.

Apparatus Runs Automatically

We now have established a heat differential of nearly 100 degrees. The boiler and the condenser are an innovation. Note that each is set in the water of their respective tanks. The system is synonymous with placing a conventional boiler in a mass of molten lava. The boiler-condenser system is partly filled with pure, distilled water. The initial vacuum is established by injecting live, super-heated steam into the system. Then the cocks are closed, and when the steam condenses a permanent vacuum is established. Thereafter the boiler vaporizes a vast amount of water; the condenser liquefies the vapor; an injector pump returns the water to the boiler; an eternal cycle going on continuously, while between the two, a low pressure steam turbine converts the energy into terms of kilowatts.

Let us now transpose our theory into commercial terms. Southern California offers some ideal locations for a solar power-plant. Almost any point along its coast would meet the physical requirements, but Salton Sea, at the north end of Imperial Valley, is most ideal. Here the mid-day sun gives rise to temperatures of 110 to 120 degrees. And, too, the air is very dry which adds to the efficiency of the cooling system.

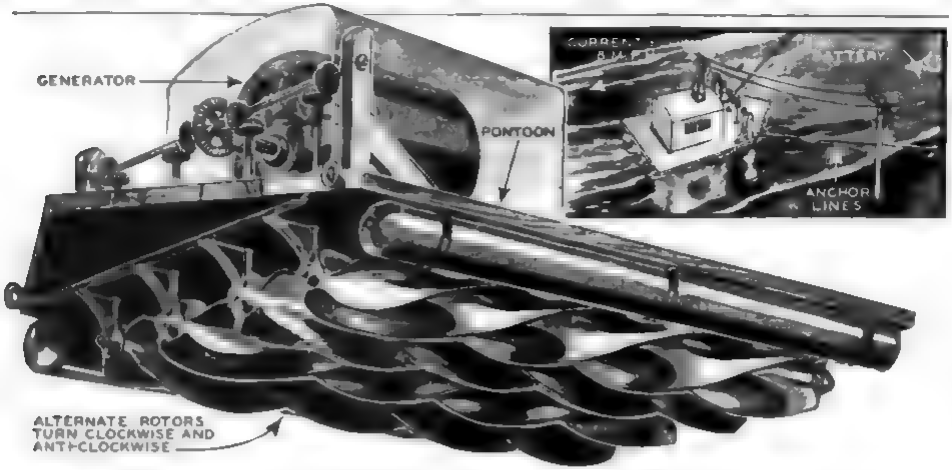
Construction Cost Moderate

The initial cost of erecting a power-plant like this would not be prohibitive. Even if it cost twice as much as a conventional steam plant of the same power output, this would be more than offset in several years by lower upkeep cost. The solar plant could be made so automatic in operation that it would require practically no attention.

Practically the only upkeep cost of this solar distillation plant is for fuel for a small gasoline motor which operates two pumps; one for pumping the distilled water to the storage tank, and the other for maintaining the salt water in the evaporation basin. A surplus of water must be provided to the evaporation basin to prevent crystallization, and, too, the basin must be thoroughly flushed out occasionally.

Still a third apparatus, deriving its power from running water rather than wave motion, has been built by an Arizona rancher. A main irrigation canal bordered his land, with a flow of 8 m.p.h. He constructed a raft with four 18-inch spiral rotors underneath, linked the driveshaft of each to a common shaft which drove a 32-volt gen-

Flow of Water in Irrigation Ditch Supplies Ranch With Free Current



An Arizona ranch owner generates all the current used on his ranch from the 8 m.p.h. flow of an irrigation stream. Movement of the water turns the rotors which drive an electric generator. Principle of the design is exceedingly simple.

erator. The motor functions with perfect satisfaction and supplies all the current consumed on the ranch. One of the accompanying drawings makes its construction clear. A similar machine can easily be constructed by anyone.

Electricity From Flowing Water

A momentum motor of this type has infinite possibilities. Imagine one with a battery of 20 spiral rotors 30 feet in diameter set in "the narrows" of the Bay of Fundy with its 60-ft. tides! Or in the St. Lawrence River or at Sault Ste. Marie! Or at numerous points in the Ohio, Missouri, Mississippi or Colorado Rivers! A momentum motor set in the Golden Gate at San Francisco without in any way impeding navigation, would develop enough power from the inflowing and outflowing tides to supply electricity to all the bay cities. As long as the tides ebb and flow, our supply of electricity will be assured.

On all sides we see examples of wasted energy –power! Think of what is wasted every day by the millions of automobiles and other moving vehicles. In an automobile, heat, the very essence of power, is wilfully wasted in enormous quantities—in the radiator and out through the exhaust pipes.

Waste Power of Automobiles

Suppose a coil of copper tubing were placed inside the exhaust manifold, and a highly volatile liquid, as ether or alcohol, were injected into this coil, wouldn't the expanded vapor run a fairly sizeable "steam" engine? And couldn't the vapor be condensed in a special radiator and be used over and over?

What about the energy wasted when the brakes are applied—dissipated in friction? Cruising along at 30 m.p.h.—"Stop" sign—on with the brakes. Twenty to fifty horsepower gone beyond recall.

Suppose instead of friction brakes, electrical brakes were used, and the current generated were stored in batteries, how much wasted energy could be saved?

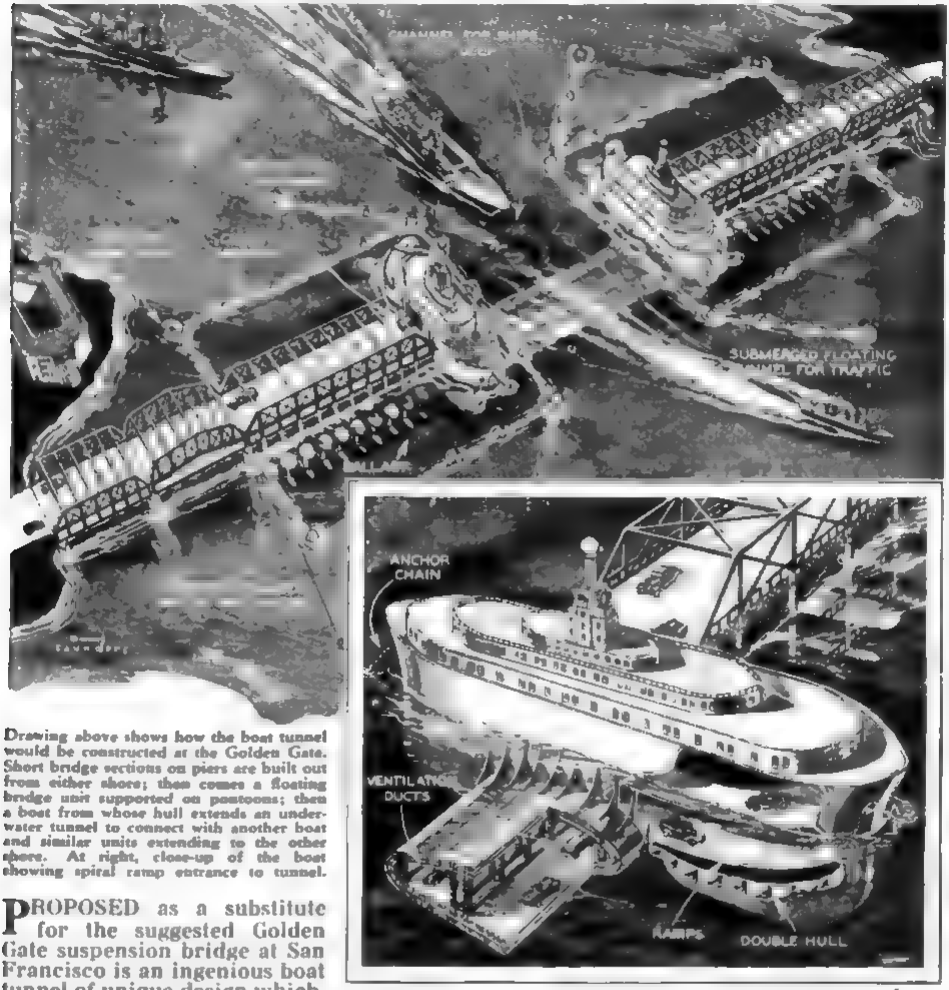
Of course, with fuel at a reasonable price, it is not practical to make the elaborate installations necessary for conserving the wasted energy. We have one outstanding example of its being done. On the electrical section of the Chicago, Milwaukee & St. Paul railroad, when a train goes down the long grade over the Cascade mountains, the motors are converted into generators and serve as electric brakes, and at the same time push considerable current back into the line, which is utilized by another train coming up the grade. Trains are scheduled to take advantage of the electrical counterbalance.

Heat Represents Power

Heat is usually associated with all motors and engines. Somewhere in the scheme of things heat has played a part. But the generally accepted idea is that abnormal heat is required, as in the steam engine and internal combustion motor. The fact of the matter is that potential power exists wherever two masses of different temperature are available. Dr. Georges Claude demonstrated this with his remarkable vacuum, or low pressure steam turbine, down on the coast of Cuba, described in a past issue of MODERN MECHANICS AND INVENTIONS.

Much has been written about atomic power, the tremendous energies compacted within the atom being depicted as capable of furnishing all the power the world will ever need for billions of years. This is undoubtedly true, but scientists are by no means sanguine that a method of applying the atom's power will ever be devised.

"BOAT TUNNEL" for Harbor Crossing



Drawing above shows how the boat tunnel would be constructed at the Golden Gate. Short bridge sections on piers are built out from either shore; then comes a floating bridge unit supported on pontoons; then a boat from whose hull extends an underwater tunnel to connect with another boat and similar units extending to the other shore. At right, close-up of the boat showing spiral ramp entrance to tunnel.

PROPOSED as a substitute for the suggested Golden Gate suspension bridge at San Francisco is an ingenious boat tunnel of unique design which, it is claimed, can be built for one-third the estimated $35,000,000 cost of a suspension bridge. This and other advantages of the design have led authorities to consider seriously the erection of the boat tunnel bridge, which would be the only one of its kind in the world. It was conceived by Cleve F. Shaffer of San Francisco.

The plan comprises a combination of several short truss spans of ordinary construction, two seadrome type floating sections, the boat tunnel, anchorages and protective barriers. The two seadrome members are simply long platforms supported above the waterline by columns resting on buoyancy chambers below the surface.

Connected to and between the platform members is the boat tunnel section, consisting of a 1200-foot tubular tunnel floating 45 feet below water level, joining the two hulls. Inside the hulls are ramps at 4% grade on which automobiles travel up or down in high gear.

The advantage of this design to shipping is apparent, since a clear channel 1000 feet long and 45 feet deep is open at all times.

As a protection to the hulls and floating sections of the bridge, a resilient chain barrier would be hung from anchored buoys carrying lights and sound warnings. Because of strong tidal currents the floating units would have to be anchored in solid rock, and provision has been made for automatic motors to take up slack in the anchor lines. Underwater stresses are greatly reduced by streamline shape of the parts.

Tin Hat on Rock Drill Keeps Dust From Worker's Lungs

Rock dust created by drill is sucked up into tin hat covering the bit, while flexible hose carries particles away to receptacle. All danger of silicosis in lungs is eliminated.

SILICOSIS, a pulmonary disease caused when particles of silica become lodged in the lungs, need no longer be a menace to the health of operators of rock drills, thanks to a new dust eliminator developed by George S. Kelley, mechanical engineer.

The apparatus, shown in the accompanying photo, consists of a tin hat, with a hole in the top for the drill, fitting snugly against the ground. A flexible suction tube draws up the dust created by the drill and conveys the particles to a receptacle. The eliminator proved its worth in a test held recently on work on Radio City.

Rock Currents May Cause Quakes

VAST slow currents of half-liquid rock deep in the earth's crust are believed by Prof. Arthur Holmes of the Durham University, England, to explain earthquakes and other such terrestrial upheavals. The continents drift on these currents, it is assumed, like balloons in the trade winds. At intervals the rock currents apparently interfere violently enough to cause earthquakes and other subterranean "storms."

Electric Clock Performs Chores

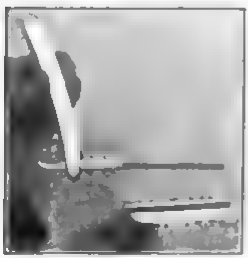
AN ELECTRIC clock that performs all your chores for you has now been placed on the market for household use. Shown below, the clock has a battery of levers disposed around the face which are pressed for the particular chore to be carried out. At the time indicated the clock then turns on the current to the furnace, cookstove, light, fan, or whatever you may want operated. It works on a 24-hour schedule from electric light socket.

By setting indicators around face, clock will turn on lights, fan, furnace or whatever you want operated. Alarm also calls you at hour desired. It operates from house current.

The Why of "Ghost Arm" Feelings

MANY individuals whose arms or legs have been amputated continue for a time to have ghostly sensations that the vanished limb still exists, especially the fingers and toes. In many instances the imaginary arm or leg seems to shrink slowly until finally the ghostly member may seem to dissolve to nothing and disappear. Most of these false feelings from amputated limbs originate in mixed-up connections between nerve cells and the brain.

Extra Blades for Straight Razor



A fresh blade is slipped on lever of the straight edge razor.

THE old straight edge razor is now provided with removable blades. This new innovation is being marketed with a set of six blades of high quality steel. Blades are grooved along the upper edge to fit securely on the blade lever, as shown in photo.

Bombshell Mikes Make Permanent Record of Conference

WITH the aid of a new electrical system making use of a battery of bomb-shaped microphones and a switch board, the recording of minute but important details of lengthy conferences is now simplified to a considerable extent. In addition, greater accuracy in the transcription is obtainable.

During the conference, the bomb-shaped mikes rest in front of the members, one mike to a man, as illustrated in the photo at the right. These microphones are switched on by the chairman, and the voice of the speaker is carried to an electrical dictating machine on which is recorded the speeches and agreements of the conferees.

Confusion is avoided by switching in only one mike at a time, a red signal light indicating to the speaker when he may begin. The device may be plugged into any ordinary 110-volt electric socket.

Voices of conferees are picked up by bombshell mikes on table and recorded on dictating machine. Chairman operates the switchboard, cutting in mikes for various speakers.

Prehistoric World 8 Stories High

A MAMMOTH metal globe, as high as an eight story building, will represent the earth and house one of the most spectacular exhibits at the Chicago World's Fair in the summer of 1933.

Within this huge globe, a model of which is shown below, mechanical monsters in a strange prehistoric zoo will reproduce scenes which took place millions of years before man appeared on the earth. The exterior of the globe will be covered with a map of the world, with oceans represented in gleaming silver-colored steel.

All the prehistoric animals to be seen in the interior are constructed of wood, steel, canvas and papier mache, containing from one to sixteen motors. Expert operators at switchboards will make these fabulous creatures roll their eyes, lash their tails and swing their heads from side to side. In addition the beasts will roar and squeal in the most horrifying manner.

Hill Slides on Talcum Powder

COLORING the water that runs underneath a sliding hillside near Ramsey, in northern California, is the latest idea of engineers of the Northwestern Pacific Railway in an attempt to locate the mysterious underground lubrication that makes the hillside slip. Fifty feet underneath the sliding surface, borings have disclosed, is a stratum of the mineral called talc. This, when wet, is as slippery as grease.

Here is model of mammoth metal globe which will house prehistoric monsters in setting showing world as it was million years ago. Meters will make beasts roll eyes and roar. Globe, to be seen at Chicago world's fair, will be eight stories high.

Movies Record Eloquence of

General Hugh Scott, 80-year-old veteran of Indian wars and master of the sign language, asking "Who are You?" To which Deer Nose, of Montana, answers, "I am a Crow." Crow tribe is indicated by waving hand with wing-like movement.

by **JACK READ**

Lest the eloquent sign language of the Indians pass into oblivion with the death of the famous chiefs now living, "Palefaces" are making movie records of the strange words of Indian intertribal speech. Learn from this unusual article how to convey ideas in the manner of our true "first American families."

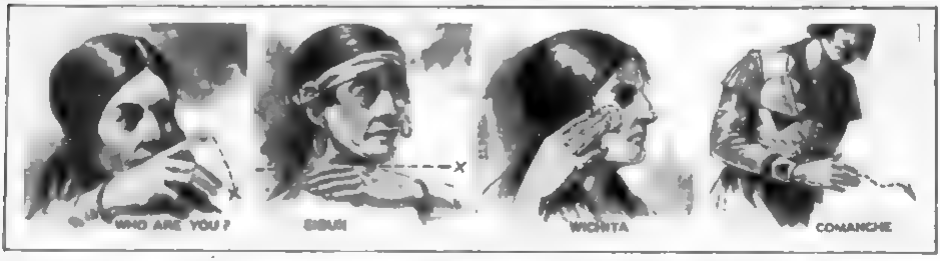
AN AGED Indian sat with his hands folded, dressed in the colorful regalia of his tribe. Beside him in council formation sat chieftains of other tribes. In front stood a motion picture machine, its operator awaiting the orders of the grey haired United States Army general standing to one side.

"Ready?" shot out the General.

"Ready," replied the cameraman. 80-year-old Bitter Root Jim, a Montana Flathead Indian, lifted his gnarled hands into action. The aged fingers began to weave back and forth. To those who understood their motions they told a thrilling adventure of his youthful days—the fierce fight with the great black bear.

Following the completion of this film old Mountain Chief, a Blackfoot, arrayed in the splendor of his tribe, told in intertribal sign language his experiences with the Buffalo herd he once hunted.

Strange Owl then spoke for the Cheyenne tribe, of days of high adventure. Others followed, some relating tales of the big hunting ground, others registering old legends.



In asking "Who are you?" Indian points toward person being questioned and moves finger up and down. Sioux answers by drawing hand across throat, a sign taken from tribal custom of cutting off heads of enemies. Wichita tribal sign derives from custom of painting cheeks. Comanche indicates his tribe by wiggling hands like a snake.

the INDIAN Sign Language

Above Mountain Chief Blackfoot of Montana, eighty years old and almost blind, is telling with his expressive hands the story of thundering buffalo herds in the days when he was a mighty hunter on the great western plains.

Chief Arickaree, a Sioux of North Dakota, dressed in full tribal regalia, "talking" before camera.

In making the film records of the eloquent sign language, the teepee sides were rolled back to let in the sun light, while Indians sat in a semi-circle before the movie camera.

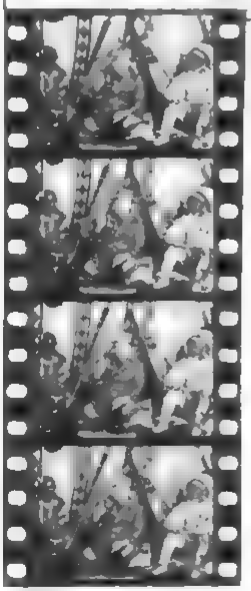
Thus, day after day, the eloquent hands of fourteen old tribal chieftains are recording for the "great white Father in Washington" the science of intertribal communication, the means by which Red Men speaking varied tribal language might meet on a common ground. When the old chieftains are all gone and the Indian sign language a thing of the past, Uncle Sam will have thousands of feet of film perpetuating these unspoken words.

General Hugh Scott, of Indian fighting fame, an eighty-year-old veteran himself, has been the go-between in the matter of recording the sign language. There are 1300 of these signs and General Scott is one of the few white men who understand and can speak the Indian sign language. Among the Indians he bears the name of "Mole-Te-Qu-Op," or "the man who talks with his hands."

Prior to the perfection of the movie it has been difficult to get a faithful record of the Indian sign language. Diagrams have been drawn and still photographs made, but no still can convey the exact significance of the signs. Nor can it give an idea of the grace and dignity embodied in the art when spoken by the hands of the Red Man.

The white man wears a hat, so Indian identifies "Palefaces" by drawing index finger across forehead where hat brim rests. Cattle are indicated by crooking index fingers outward to simulate horns. Big mysterious eyes of owl give the sign shown.

Above you see depicted in sign language the fable of "The Wolf and the White Man." Movements of the hands are shown by the dotted lines. Note how adjectives follow nouns, as in "a wolf hungry" for "a hungry wolf." Verbs are in present tense.



In section of film here, tribal chiefs are holding a palaver with General Scott, one of few white men who understand sign language. Indians call him "Mole - Te - Qu - Op" or "Man who speaks with hands."

An emphasis here, a slowing up of the gesture there, the facial expressions accompanying the signs, all round out and amplify the movement. The backs and palms of the hands, the outer and inner sides convey varied meanings. There is no time when the Indian is as magnificent as when he communicates in this intertribal language with the members of other tribes.

"The soft silent wooings of love, the frantic fury of hate, the dancing deliriums of joy, the hungry cravings of desire, the settled melancholy of dead hopes," says Capt. Clarke, a pioneer in the transposing of the signs.

The syntax of sign language is supposed to follow that of the Indian spoken language. Articles, conjunctions and prepositions are omitted and adjectives follow the nouns. Verbs are used in the present tense, nouns and verbs in the singular number only, the idea of plurality being expressed in some other ways.

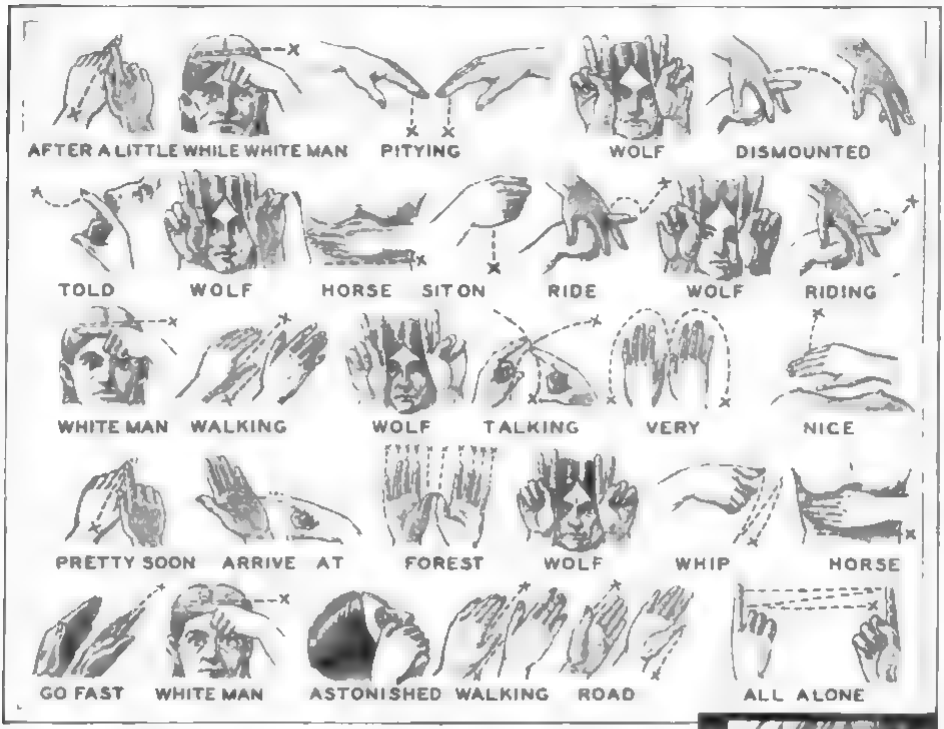
We say of a thing, "It is not good," the Indian says, "It is good not." We would ask "Are you hungry?" Indian says, "maybe so you hungry." Our word *when* is often expressed by the Indian as *day*. As "Day you come, I pay you."

The Indian never uses the pronoun I. The single words, hungry, sleep, go, etc., refer to himself. However, when he is speaking of the second or third person he always signs *you* (index finger pointing towards the party) and *he* (elevate the thumb and move it nearly straight upward past front of forehead).

The first thing that an Indian signs to another tribal visitor is "Who are you" (See General Scott in photo), to which the visitor replies by giving his tribal sign.

Tribal signs have arisen out of peculiar tribal customs. For instance the Sioux or Dakota Indians used to cut off the heads of their enemies after they were slain. Accordingly the tribal sign of the Sioux is a motion across the neck.

Camera Records Eloquent Facial Expressions Along With Hand Motions



The second part of the story of the cunning wolf and the credulous white man. Hand motions are accompanied by vivid facial expressions, which add dignity and eloquence to the story. Movies record these qualities to minutest details, as shown on these pages.

The Osage wear their hair in a roach on top of the head and their tribal sign is a raising of the hand to that part of the head.

The Wichita tribe paint their cheeks and a motion simulating this custom supplies the tribal sign. Comanche makes a snake-like movement with his hands, which refers to some custom known only to himself.

Indian myths and fables have been kept alive by means of the sign language. These have been handed down from father to son and mother to daughter in the tribal signs and are handed around to other tribes in the intertribal sign language.

One of these fables, the Wolf and the White Man, is pictured above and gives a good idea of the signs for various words, when the reader supplies the movements as shown by the dotted lines.

The origin of some of the sign-words is interesting. The White Man wears a hat, so the Red Man identifies him by drawing the index finger or the whole hand across the forehead where the hat brim rests.

As Dr. Walter Hough, curator of the Bureau of Ethnology of Smithsonian Institute says, "The Indian signs represent form and motion conveying to the mind a picture; that is, the signs were *ideagraphs*, an extension of *picture writing*."

Take the signs for the various animals. That given in the diagram for wolf may also mean fox, with varying expressions of the face. For any horned stock, both crooked index fingers are pointed outward on either side of the head.

The habit of a deer and other game to jump first to one side and then the other in fright suggested the sign word of extending the right index finger obliquely upward in front, moving

(Continued on page 166)

Strange Owl, of the Cheyenne tribe, telling of days of high adventure in his youth. While camera whirs he narrates the story of his fierce fight with a great black bear.

Two-piece Suit With Zippers Keeps Army Flyers Warm

New outfit to keep army birdmen warm at high altitude consists of two pieces, trousers and coat. The former is fastened down the legs by zippers, as is the coat, which allows greatest ease in donning the outfit and gives tight fit.

WHEN flying at high altitudes, where the temperature runs way down below zero, birdmen of the U. S. Army Air Corps have been in the past compelled to protect themselves by wearing cumbersome leather and fur "teddy bear" suits. A new type suit recently perfected, however, goes a long way towards making existence at high altitudes more comfortable.

In the photo at the left is seen an army pilot wearing the new suit. It consists of two pieces, the coat and trousers. The latter part is fastened down the legs by zippers. Likewise the coat, thus permitting ease in donning the outfit. With this method of fastening, the suit fits closer and tighter, allowing more warmth when the plane ascends to colder regions of the sky.

Huge Gains Made in Disease War

A CONCEPTION of what the United States has gained in the past quarter of a century from sanitary science is seen in insurance figures for the changes of death rates during this period. Largest of the decreases in death rates is that of typhoid fever, which fell 92 per cent between 1904 and 1929. Another significant gain is the decrease of 80 per cent in the death rate from diarrhea. A third is that of 77 per cent in the death rate from diphtheria.

The fourth significant decrease is one of 58 per cent in the death rate from tuberculosis and the fifth is one of 36 per cent in deaths from pneumonia.

Pupils Assemble Giant Puzzle Map to Study Geography of United States

A REVOLUTIONARY method of teaching geography has been inaugurated in the elementary schools of Grants Pass, Oregon. Instead of listening to dry lectures in the classroom, the children put together a huge jig-saw puzzle measuring 36 feet in length and 19 feet in width. Each section of the puzzle is a separate state in the Union, as illustrated in the photo below.

Educators who devised the method claim that it teaches the proportional size of each state, its location, and the names of the surrounding states far more effectively than the usual methods. In assembling the map each child carries a state and puts it in its correct place, so that geography thus becomes a game which retains the child's interest throughout the lesson.

Children take keen interest in geography lessons when assembling this giant jig-saw puzzle consisting of sections in shape of the 48 states of the Union. Completed map, when fitted together, measures 36 ft. in length and 19 ft. in width.

Police Get Alarms by "Curbstone" Radio

Cable excited with 500-cycle alternating current, which is broken up into dots and dashes by automatic coding device, is installed in conduits in sidewalk. Watchcase receiver on patrolman's cap picks up broadcasted alarm signals.

POLICE departments have found it necessary to rely almost entirely upon rapid communication successfully to combat the modern criminal. The problem of immediate contact with officers on their beats has been a most difficult one, however, and only recently has a solution been offered by engineers.

In the scheme submitted and illustrated in the above photo, an electrically excited cable is placed along the curbstone—if permanent installation is made, cables would be placed in conduits as shown in photo. Cable is excited with a 500-cycle alternating current which is broken up into dots and dashes by an automatic coding device.

Each patrolman is equipped with a small coil that he carries in his pocket, and a special watch-case receiver which is so attached to his hat that he need not actually carry it over his ear to enable him to hear signals passing over the system. Each policeman has a signal call.

Warning to People With Freckles

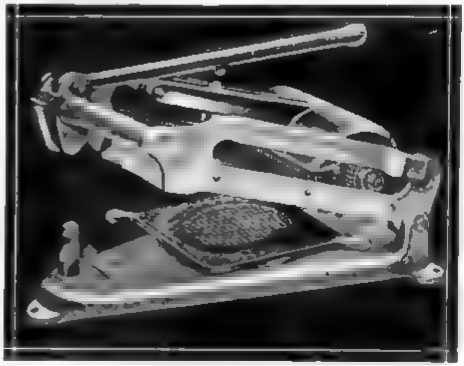
A DANGER in seashore vacations for freckled people, especially children, lies in the fact that sunshine at the seashore is likely to be stronger than at inland resorts. One reason for this is that the ultra-violet rays that cause sunburn are reflected from the water with almost double force.

Such sunlight is healthful, but its effect on freckled people is likely to be too stimulating. The dark spots of the freckles absorb great heat of sun's rays and work havoc on the system.

Device Makes Tough Steak Tender

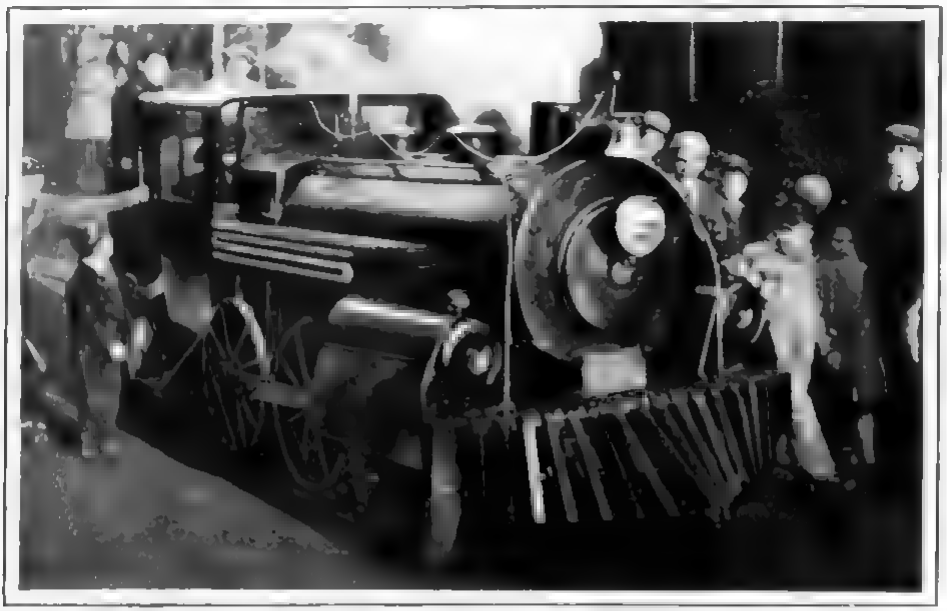
TOUGH steaks, which have conducted a regular "reign of terror" among housewives and chefs these many years, have finally been struck a fatal blow through the invention of the cubing machine shown below.

Replacing the old pounding method, this device adds tenderness to the meat by cutting it into quarter-inch cubes so that it can be cooked on six sides instead of four. A thin film is left on the bottom of the steak to hold it intact. After being cubed, the steak cooks so quickly that very little of its juice and nourishment is allowed to escape or dry out into toughness.



Steak is cut into ¼-inch cubes by this machine, a thin layer being left on bottom to hold the meat intact.

Iron Horse Built by Youthful Mechanic Goes 80 M.P.H.



This rubber-tired "iron horse" was built from an old style steam car by John Reed, fifteen-year-old Chicago youth, who spent two years on its construction. It is operated from the cab like a car and will go over 80 miles an hour.

Baby Jumbo's Leg Set With Tackle

SETTING a broken leg on a 350-pound "infant" elephant is no simple task. When Zoobu, a "new arrival" in the animal incubators at Atlantic City, broke his leg, it was necessary to use a block and tackle to reset the limb. A ton of cotton and many miles of tape were used to wrap the splints, and a hammock, shown below, was built to relieve the weight on Zoobu's broken pin.

Specially constructed block and tackle hammock prevents Zoobu from putting any of his 350 lbs. on the broken leg.

JOHN REED, fifteen-year-old Chicago youth, stirred up a lot of excitement among the boys in his neighborhood recently when he started touring about in his home-made "iron horse." The machine, shown in the photo above, was made from an old type steamer car and two years were required for its construction.

Run entirely by steam, the vehicle is capable of a speed well over eighty miles an hour. It resembles a train engine in outward appearance, with the exception of the rubber wheels which were installed for smoother riding on the streets. All controls are manipulated from the "cab" in which the driver and passengers ride.

24-Hour Wind Vane Read by Color

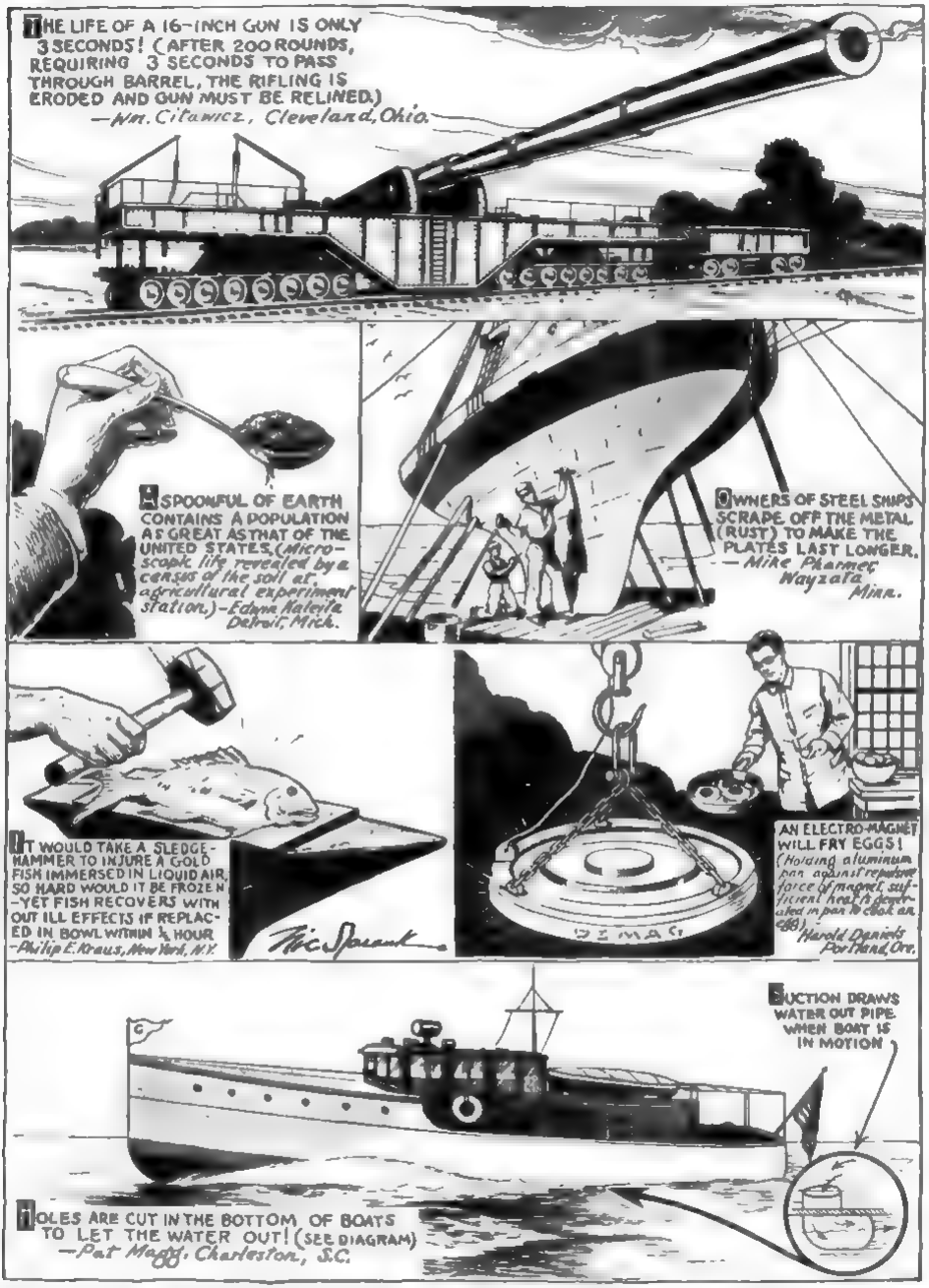
A DAY and night wind vane which tells the wind direction by color has been invented by Dr. E. E. Fournier d'Albe, well-known English physicist. The small square box mounted on a pivot is equipped with the ordinary indicating arrow.

The novelty is that the box is painted a different color on each side; blue for north, green for south, white for east and red for west. In addition, each corresponding side of the box is provided with a plate of colored glass of these same tints. An electric lamp is set inside the box.

Colors show direction of wind during the day and electric lamp lights up box at night so color can be seen from a distance. This is a real convenience in bad weather.

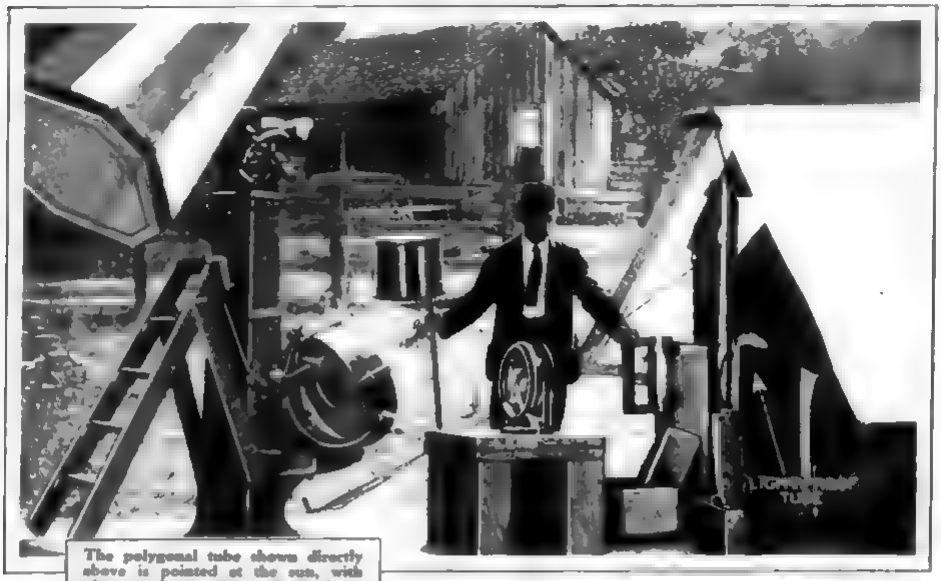
Oddities of SCIENCE

by NIC SPRANK



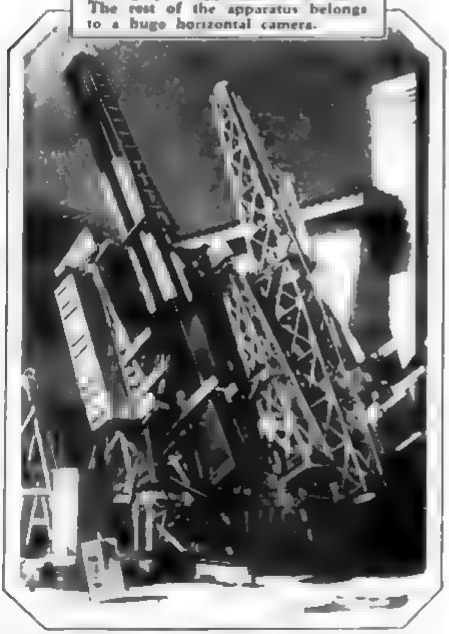
What scientific oddities do YOU know? Send them in to Nic Sprank—for all those used on this page, he will pay one dollar. Be sure to send proof of your statements. There is no limit to the number of suggestions you may submit. Address your letter to Nic Sprank, Modern Mechanics and Inventions, 529 South Seventh Street, Minneapolis, Minn.

ECLIPSE Gives "Lowdown"



The polygonal tube shown directly above is pointed at the sun, with photographic apparatus in its base. The rest of the apparatus belongs to a huge horizontal camera.

The mirror shown in the above photo reflects the sun's image through the lens which can be seen directly in front of the man, and thence through a tube of black cloth, 135 feet long, at the end of which the image is registered on a photographic plate in a light-tight hut. A white canvas tent was placed over the tube along its entire length.



Apparatus for photographing a solar eclipse, constructed by the Mt. Wilson Observatory for the eclipse of Sept. 10, 1923. Two big photographic telescopes and several other instruments are here seen mounted on a steel framework, which was moved by a driving clock to follow the movement of the sun in the sky. Cameras of great focal length are required to secure large photographs of the sun, and construction must be extremely sturdy to eliminate vibration.

by **WESLEY FOSTER**

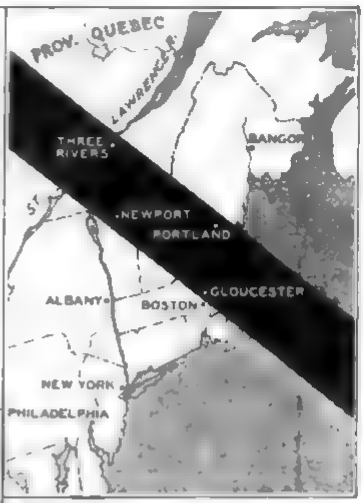
Total eclipses, with their accompanying demonstrations of shadow bands, coronal displays, and solar protuberances, are among the most striking of natural phenomena. This August an eclipse, total in eastern United States, is due to occur, and scientists are making elaborate preparations to study it with the hope that some of the larger mysteries of the sun's private life may be answered.

WEATHER permitting, the most marvelous, awe-inspiring spectacle afforded by Nature—a total eclipse of the sun—will be witnessed by millions of people in New England and eastern Canada on the afternoon of August 31. Don't, if you can help it, miss being one of the spectators within the track of totality, shown on the map on the following page. Outside this track the eclipse will be seen as a partial one all over the United States, but partial eclipses are relatively tame and uninteresting.

The track of totality is the strip of the

on SUN'S PRIVATE LIFE

Above, a series of photos of the sun taken at Canton, N. Y., during the eclipse of Jan. 24, 1925. As the picture shows, the eclipse was not quite total at this place. At the right is the sun's corona photographed during a total eclipse at Wallal, western Australia, Sept. 21, 1922. The shape of the corona varies with the sunspot period. This picture shows its typical shape at a time of sunspot minimum. Many mysteries of the corona are yet unsolved.



On the afternoon of August 31, 1932, a total eclipse of the sun will be seen inside the area depicted by a black band on map.

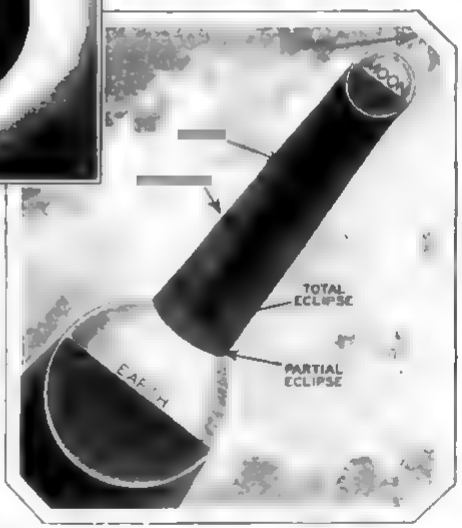
earth's surface, about 100 miles wide, over which, on account of the combined movements of the earth and the moon (the rotation of the former and the orbital movement of the latter), the long cone of the moon's shadow will sweep at a speed of about 30 miles a minute.

The shadow, coming from the northwest, will reach the St. Lawrence River at 3:23 p.m., eastern standard time. At 3:32 it will reach Cape Cod, which will be the last land to see it. Then the shadow will sweep on over the ocean, leaving the earth in mid-Atlantic, so that some fortunate tourists returning from Europe may have the rare experience of seeing a total eclipse at sea.

Eclipses Strike Twice Every 360 Years

Somewhere on earth a total eclipse of the sun occurs about once in two years, but because the shadow track is always a mere pencil mark on the map—never more than 168 miles wide and usually less than 100 miles wide—one is visible in any particular locality only about once in 360 years on an average. Thus for most human beings the sight of one is even rarer than the proverbial "event of a lifetime."

Within the track of totality the unforgettable, soul-stirring experience begins a couple of minutes or so before the sun is completely blotted out by the black bulk of the moon. The sudden fading of daylight at that stage—almost as if you were aboard a train entering a tunnel—takes most people by surprise.



How an eclipse occurs. The moon passes between the sun and the earth, and its shadow is projected. The dark central cone is known as the umbra, and the eclipse is total where it falls on the ground; the larger outside cone is the penumbra, and eclipse is only partial in areas it covers.

"Shadow Bands" of Eclipse Are Reflections of Waves in Atmosphere

The uncanny effect of this abrupt transition from day to night is enhanced by the sun-set glows along the horizon, the appearance of stars in midheaven, and the flashing forth of the incomparably beautiful corona; the outer atmosphere of the sun, never seen except during a total eclipse.

Animals, Plants Fooled by Eclipse

At Norfolk, Virginia, during the eclipse of 1900, the streets and roofs were crowded with spectators, including a large percentage of negroes. At the moment totality came on, the *breaking of glass* could be heard on all sides, as the amazed and startled people let fall the bits of smoked and tinted glass through which they had been viewing the sun.

The rapid fading of light at such times is noticed not only by human beings but also by the lower animals. Birds fly about and twitter excitedly; roosters crow, and dogs bark. At the beginning of totality fowls go to roost, dew or frost may form, and many plants close their blossoms. For a minute or so before totality and also just after it is over, ghostly "shadow bands" may be seen flitting over any exposed white surface.

A white sheet fastened down smoothly over a patch of level ground affords a good means of observing these bands, which were, until a few years ago, a mystery to scientific men but are now known to be the shadows of waves in the earth's atmosphere, rendered distinct by the narrowness of the remaining crescent of the sun's disk. Good photographs of shadow bands have been obtained at some recent eclipses.

Mystery of "Baily's Beads"

Another interesting sight at the beginning of totality is the breaking up of the thin solar crescent into a number of spark-like spots known as "Baily's beads," which are due to the sun shining between some of the mountains on the moon.

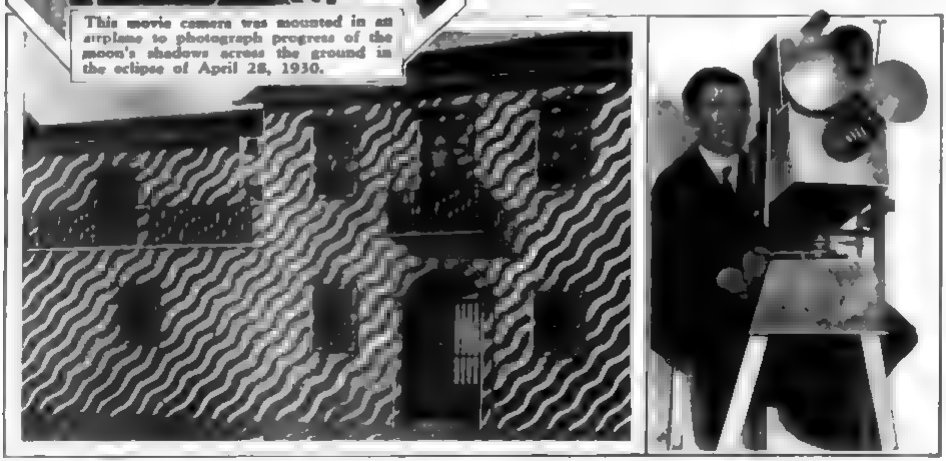
Frequently during totality the spectator is rewarded with a view of one or more "prominences"—pink-red protuberances of various shapes extending from the dark circle of the moon. These are great outbreaks of incandescent gases, sometimes towering to heights of hundreds of thousands of miles above the surface of the sun.

Sunspots Affect Corona

The corona, a crown of pearly light extending out from the sun half its diameter or sometimes much more, is the most attractive feature of a total eclipse and also one of the most interesting from a scientific standpoint.

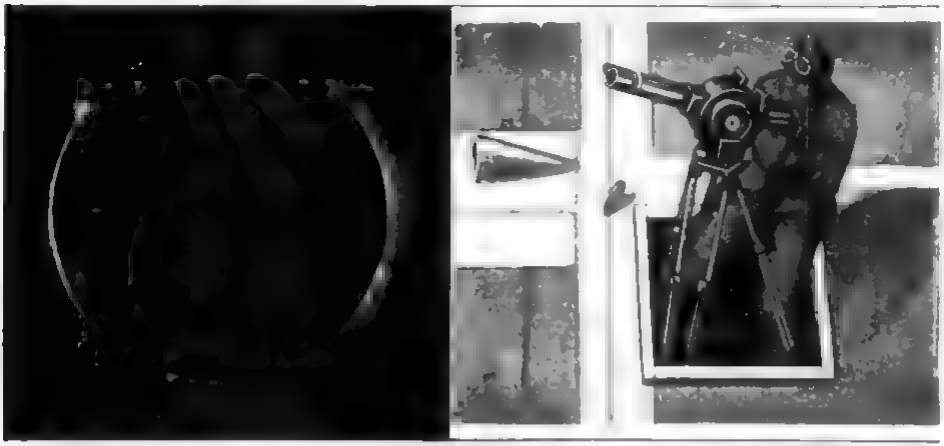
The shape of the corona has long been known to vary with the 11-year sunspot period, but the eclipse of October 22, 1930, as observed by the expeditions sent to "Tin Can Island," in the Pacific Ocean, surprised the astronomers by displaying a corona of

This movie camera was mounted in an airplane to photograph progress of the moon's shadows across the ground in the eclipse of April 28, 1930.



Mysterious "shadow bands" seen during an eclipse are shown in drawing above as they were sketched by an observer in Sicily. They have been found to be shadows of waves in the earth's atmosphere, rendered visible by the slender crescent of the sun's disk. At right is shown a camera for photographing eclipses, with a special outside shutter.

Dirigible Airships Carry Eclipse Photographing Apparatus Above Clouds



At left above, eruptions on the sun seen during a total eclipse. The picture was under-exposed to avoid over-exposing the prominences and thus obscuring them, and for this reason very little of the corona can be seen. At right, a motion picture camera, mounted on top of the airship Los Angeles, was used to photograph progress of this same eclipse.

the shape characteristic of the minimum stage of sunspots, though the eclipse occurred only two years after sunspot maximum and four years before the expected minimum, due in 1934. Hence astronomers are wondering what shape the corona will assume in this year's eclipse.

Many spectroscopic observations will be made at the forthcoming eclipse with a view to exploring the nature and movements of the corona. To this day we know practically nothing about the alleged light gas "coronium," which has figured in descriptions of the sun since the eclipse of 1869, and of which, according to some authorities, the outer solar atmosphere is composed. About 18 lines in the solar spectrum are now provisionally attributed to this problematical gas.

Radio Times Eclipse From Airplane

Almost every solar eclipse brings forth new methods of observation. In recent eclipses some observers have viewed and photographed the eclipsed sun from aircraft—chiefly for the sake of getting above obscuring clouds—and during the eclipse of April 28, 1930, the very brief totality of which was visible in California, the advance of the shadow over the ground was timed by means of sound-picture apparatus carried in an airplane. The time the shadow reached each point in its progress was exactly registered by radio time signals recorded on the film.

Precise measurements of the times of eclipses are used in correcting tables of the moon's motion, and the fact that these tables are still somewhat in error is shown by the fact that there is nearly always a slight discrepancy between the predicted and observed time of an eclipse. In the case just mentioned totality arrived nearly 2 seconds ahead of the time predicted. The eclipse of January 21, 1925, seen in the eastern United States, was 5 seconds late, while an eclipse in 1922 was 16 seconds ahead of time.

Radio Transmission Affected

There are some marked differences in radio transmission, the frequency of "static," and other radio phenomena, between night and day, and the brief "night" produced by an eclipse has effects on radio that have been a subject of investigation at recent eclipses. Some scientific parties will concentrate on this problem at the forthcoming eclipse.

One observation, however, that has engaged the attention of astronomers at other eclipses will be lacking. This is the photography of stars close to the sun to determine whether their light is deflected by the sun's gravitation, as predicted by Einstein. There will be no stars sufficiently bright in the sun's neighborhood at the time of the eclipse of August 31.

Eclipses as Portents

In ancient times eclipses were regarded as portents, usually boding ill. In fact, even today in less civilized countries considerable superstition surrounds the blotting out of the sun by the moon, and in savage communities sacrifices are still offered up to appease the wrathful gods.

Perhaps the most familiar instance of an eclipse in literature is that called down by the hero of Mark Twain's "Connecticut Yankee," who dismayed King Arthur's magician, Merlin, by plunging the country into darkness and relenting only when freed from the chains which bound him to the stake where he was scheduled to be burned. Thus can astronomical science come to the rescue of a fictional hero!

Rust-proof "Felt-coated" Steel May Open New Metal Era

Dr. A. W. Coffman is shown above running a sheet of malleable steel through his machine, which gives it a "felt" coating. Processed metal will resist fire and corrosion.

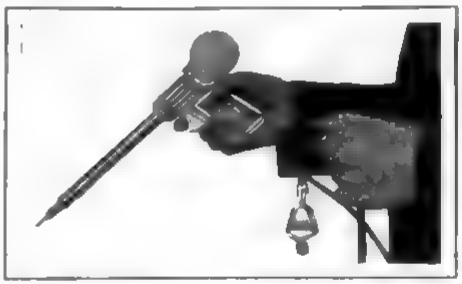
GREATER commercial possibilities for the use of steel have been opened up to the world through the development of a "felt coated" steel. By the new process, malleable metal is covered with a "felt" that can be saturated to make it resistant to fire or any other corrosive element which it may be subjected to during its period of service.

Dr. A. W. Coffman, of the Mellon Institute Laboratories, Pittsburgh, is the discoverer of this process, and is shown on the left coating a sheet of the metal. By use of alloys, the hitherto alien materials are made an integral part of the steel, on one side or both.

Electric Gun Is Soldering Iron

JOINTS can be soldered from above or below with equal ease when using one of the electric soldering "pistols" shown in the photo below. The new feature of this gun is that it permits the solder, which is inserted in the pistol grip, to be fed by means of a trigger operation.

Solder is forced through a channel in the center of the barrel and comes out at the tip, which is the hottest part of the iron. This iron can be operated from a 6-volt battery and is very easily handled with one hand.



String solder inserted in the pistol butt is forced through the gun barrel by pulling the trigger. Metal is heated electrically by the current from any 6 volt storage battery.

How Uncle Sam Tests Light Bulbs

ALL light bulbs must come up to fixed government standards; i. e.: the filament must be strong enough in proportion to the wattage so it will last at least 1000 hours, and all lamps of the same wattage must produce an equal amount of light.

At the Government Bureau of Standards the lamp to be tested is installed inside the concrete ball, shown below, whose interior is painted the best shades of diffusing white. Its indirect light, shines through a window, is thrown on the lens of a double microscope side by side with that from another lamp of known intensity.

Indirect light from tested bulb diffused through window on lens of double microscope must equal standard intensity ray.

Radium Gas Tests Soil Fertility

RADIOACTIVE gases not only exist in ordinary soils where plant roots are growing, but differ in quantity from one kind of soil to another. For that reason, it may be used to indicate what kinds of mineral grains are in the soil and available for plant roots to use as food.

It has been discovered that soils containing large amount of the radioactive gas, called radon, usually contain relatively large percentages of some of the minerals believed useful as foods for plant growth. Therefore it is possible that soil radioactivity might be used by farmers or agricultural experts as a quick test for minerals which make for greater fertility in soils.

Electric TROLLEY Boat to Ply Waterways

Claimed to be the first electrically-driven ferryboat ever put into operation, this barge takes current from the insulated 2-way trolley lines whose power may be shut off when cables must be dropped to river bed to let traffic pass.

A NEW experiment in marine transportation—a ferryboat that runs on a trolley wire—has been installed in the Sacramento River, California. In the test period, this ferry operated on approximately one-half the cost incurred with the old gasoline engine-powered craft.

The new installation, shown above, is distinctive in that the up-river cable by which it hauls itself across the river also acts as the trolley wire supplying power for a single-phase motor. The problem of installing this cable so that no short circuit would result when it was lowered into the water to permit river traffic to pass up and down was overcome by insulating the cable at each end with a device which automatically shuts off the current when cable is lowered into the water.

Boat has a speed of approximately 180 feet per minute and the ferry handles twelve cars.

New Bullets Have Triple Effect

A SENSATIONAL invention through which the speed of bullets fired from ordinary rifles is doubled and their effectiveness tripled has been announced by H. Gerlich, of Germany. The bullet is made from a new kind of powder and can be fired from any rifle with the spirals or grooves slightly injured.

To demonstrate the importance of this invention, it would be possible to disable tanks with mere rifle bullets which travel at the rate of 5,200 feet per second. At 150 feet they will penetrate over one-half-inch into specially hardened armor plate.

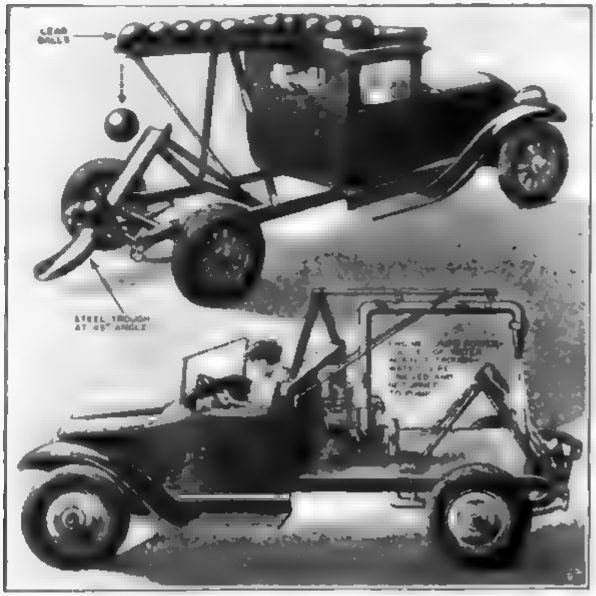
Batter Operates Pitching Device

EACH player is his own pitcher, catcher and batter when sharpening up his eye with the new automatic ball pitcher shown below, the invention of Thomas White, of San Francisco.

The batter takes his natural batting stance before the device and hits the ball suspended from the frame, as shown. Being part of the machine, the ball merely whirls around the standard, then unwinds and "pitches." Batter has time to regain his stance before the next delivery, which is naturally varied by the force of the previous hit.

Hit ball whirls around standard. By time batter has regained his stance, ball has unwound and is thus "pitched" again.

$10 for an ANSWER to



These are the freak vehicles which appeared in the May issue of Modern Mechanics and Inventions; the problem was to decide whether they would run or not, using the motive power of lead balls and a stream of water as shown.

Here are the answers to the Freak Vehicle problem which appeared in the May issue of Modern Mechanics and Inventions — also the announcement of another problem which, in keeping with the season, deals with baseball. A $10 award goes to the writer of the best letter solving the problem illustrated on the opposite page. Try your hand at it—your chance to win the award is as good as the next fellow's.

REMEMBER the freak vehicles published in the May issue of MODERN MECHANICS AND INVENTIONS—one of them an automobile with a group of lead balls on its roof which rolled off and struck a trough on the rear of the car; the other a contrivance of similar nature, except for the substitution of water for the balls, pumped against a trough? If your memory is hazy, the drawing reproduced above will jog it for you.

A $10 award was offered for the best letter explaining why the vehicles would or would not work, and the judges have at last, after due consultation of physics reference books, conversations with engineers, and consultation with Dick Cole, author of the original idea, bestowed the $10 check on Paul R. Rannie, 3251 Washington Boulevard, Chicago, Illinois.

Before giving you his prize winning letter, we will repeat the problem as it was stated:

A vehicle carries a number of heavy lead balls, on its roof, which fall off the end of a trough and strike a second trough, mounted at a 45 degree angle at the rear of the car. Will the falling of the balls make the vehicle move?

The second vehicle is similar to the first, except that water is used instead of lead balls. The water is pumped against the trough by a motor, is retrieved in a funnel after it has passed down the trough, and is used over again. Will the water power move this vehicle?

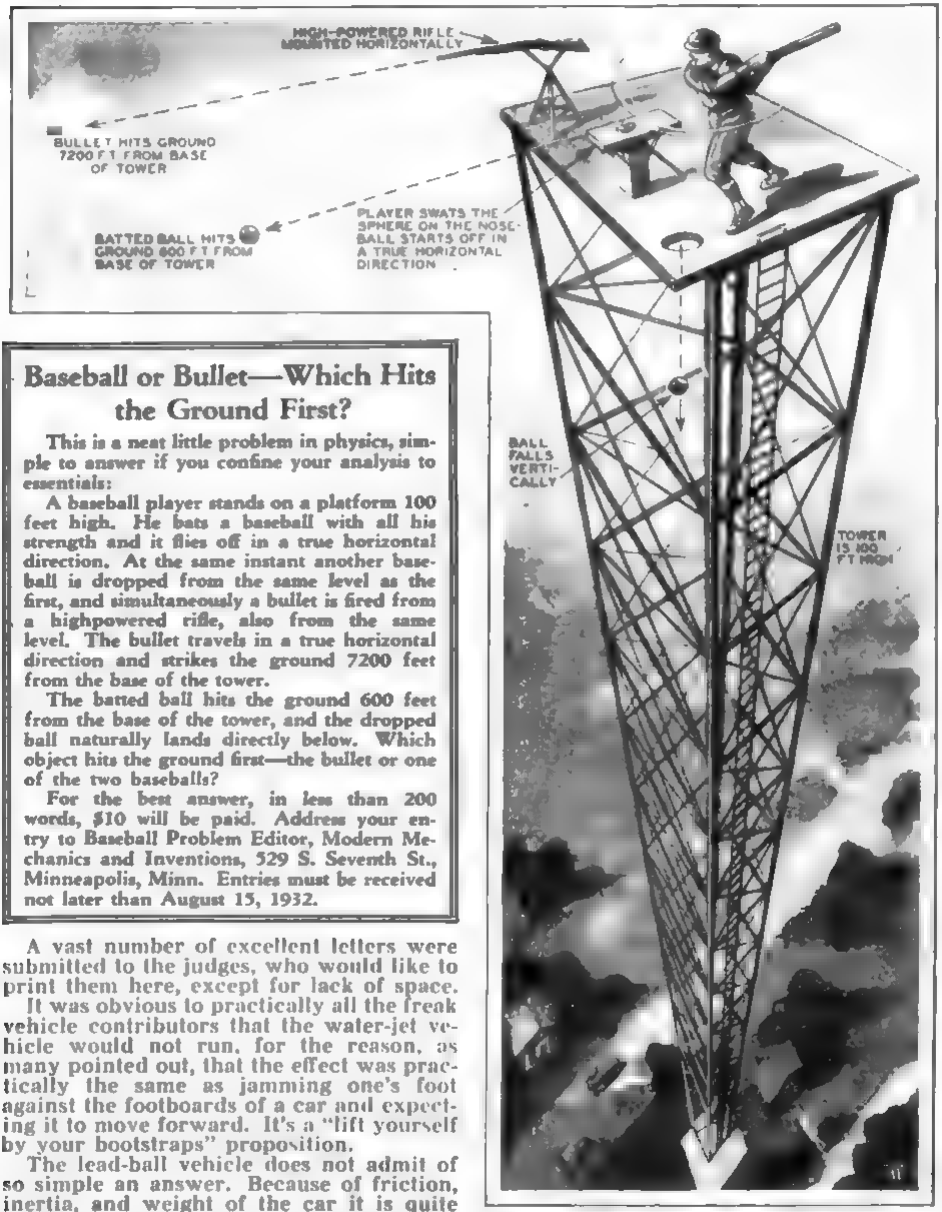
Here is Mr. Rannie's letter:

The vehicle equipped with the heavy lead balls, which fall from the roof as described, will operate. The energy is obtained from the falling of the balls from a higher to a lower level. This energy is acquired by the balls when raised to the roof. A falling ball does no work of propulsion until it strikes the trough and is deflected toward the rear of the vehicle. As it is deflected, the ball exerts a pressure against the trough tending to move it, and consequently the whole machine, forward. This action is the same as that which occurs when one billiard ball is dropped upon another and slightly to one side. One ball goes one way and the other in the opposite direction. The fact that the balls in the problem are dropped from the machine and not from an outside source does not affect the result.

The vehicle with the water pump will not work. In this case the descending water gives a push against the trough and tends to force the vehicle forward, but as the water continues to descend it is deflected in the reverse direction thus creating an equal and opposite force tending to move the vehicle backward.

The machine would be fundamentally the same if the water were forced around a closed system of pipes. Such an arrangement would be the same as a rotating flywheel and it is simple to see that a rotating wheel, unless equipped with a fan or geared to driving wheels, would be useless. If the water were shot down the trough and out the rear end, the machine would move forward, but only as long as the water supply lasted.

this BASEBALL Problem



Baseball or Bullet—Which Hits the Ground First?

This is a neat little problem in physics, simple to answer if you confine your analysis to essentials:

A baseball player stands on a platform 100 feet high. He bats a baseball with all his strength and it flies off in a true horizontal direction. At the same instant another baseball is dropped from the same level as the first, and simultaneously a bullet is fired from a highpowered rifle, also from the same level. The bullet travels in a true horizontal direction and strikes the ground 7200 feet from the base of the tower.

The batted ball hits the ground 600 feet from the base of the tower, and the dropped ball naturally lands directly below. Which object hits the ground first—the bullet or one of the two baseballs?

For the best answer, in less than 200 words, $10 will be paid. Address your entry to Baseball Problem Editor, Modern Mechanics and Inventions, 529 S. Seventh St., Minneapolis, Minn. Entries must be received not later than August 15, 1932.

A vast number of excellent letters were submitted to the judges, who would like to print them here, except for lack of space.

It was obvious to practically all the freak vehicle contributors that the water-jet vehicle would not run, for the reason, as many pointed out, that the effect was practically the same as jamming one's foot against the footboards of a car and expecting it to move forward. It's a "lift yourself by your bootstraps" proposition.

The lead-ball vehicle does not admit of so simple an answer. Because of friction, inertia, and weight of the car it is quite possible that the machine will not move at all, but none of these factors—not even the weight of the balls—was given in the problem because it was simply the driving *principle* that was under discussion.

Full details of this problem appear in the accompanying article. Here's the situation in a nutshell: A baseball player, perched on a platform 100 feet from the ground, bats a ball in a true horizontal direction. At the same instant a ball is dropped and a bullet fired from a rifle, striking the ground at distances noted. Which hits the ground first?

Perfect Business Car Equipped With Dictating Apparatus

Ediphone mounted on back of rear seat folds down so busy executive can dictate letters while being driven to work.

THE perfect business man's car is now equipped with an Ediphone so that the busy executive can dictate correspondence while being driven to and from the office.

The dictating apparatus is mounted on the back of the rear seat, as shown in photo on the left, and folds back out of sight into its built-in compartment when not in use. Extensive tests have proven that high speed driving over all kinds of roads do not interfere with its recording.

Signature Printer Curbs Forging

PAYROLL fraud and check forging are made extremely difficult by the use of a duplicating machine invented by D. F. Secord, of New York City, which reproduces the exact signature of the employee in the payee space on the check.

Signature is obtained from the employee by having him sign his name on a stencil with a stylus. When filling in the names on payroll checks, the paymaster runs them through the new duplicating machine which reproduces the employee's own signature on his check, as photo below illustrates. Endorsement corresponds with the stenciled reproduction.

Quicksilver Shows Quietest Hour

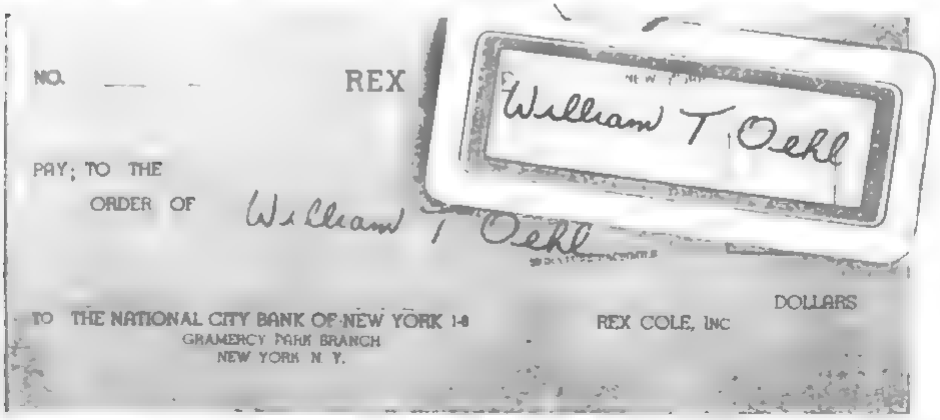
A DISH full of quicksilver was used to establish the quietest hour in Chicago, recently, when this information was needed to determine what time the clearest microscopic pictures of metals could be taken. Photos must be made when instruments are as free from vibration as possible. A small beam of light played on this metal reflected a spot on the ceiling.

New Padlock Can't Be Pried Open

Garage door staple just fits the lock opening.

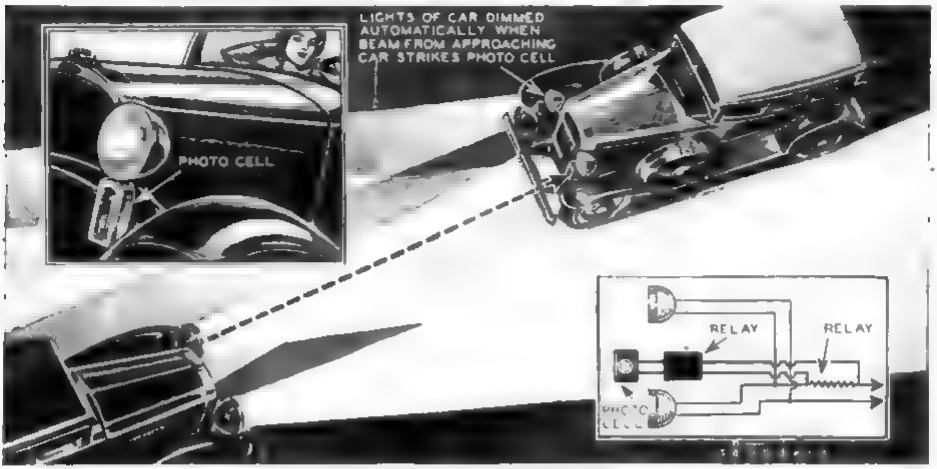
THE shape of a new style bar-acting padlock, shown on the left, makes it very difficult for prowlers to pry off the door staple. A prying tool cannot be worked into its small opening space which is just large enough to accommodate a standard size staple.

This opening is closed by a straight rod that snaps across when the thumb is pushed lightly against its exposed end. When key is turned in the lock, it automatically snaps the bar into the opening position.



Duplicating machine reproduces signature of payee on check and endorsement should tally with every dot and curve of it.

Photo-Electric Cell Dims Car Lights



When glare from the lights of approaching car strikes the liquid type photo-electric cell attached below headlight, cell generates a current which closes the relay, shown in diagram above, and automatically switches on the dimmers.

IT IS a matter of record that most of the automobile accidents that happen at night are caused directly or indirectly by headlight glare. However, if a recent patent-applied-for device goes through and comes into general use, this cause of smash-ups will be entirely removed, as dimmers will be applied automatically.

As shown in the above diagrams, this system employs a sensitive photo-electric cell of the liquid type. This is mounted on the front of the car at the bottom of the headlight. A metal hood protects it from the weather, but leaves it exposed to the light produced in the front of the car.

The circuit of the cell is so adjusted that it will be insensitive to anything but the direct glare produced by an approaching car. Then the cell generates a current which closes a relay and automatically switches on the dimmers. After car has passed the lights are automatically returned to their previous focus.

Human Cells Creep Like Amoebas

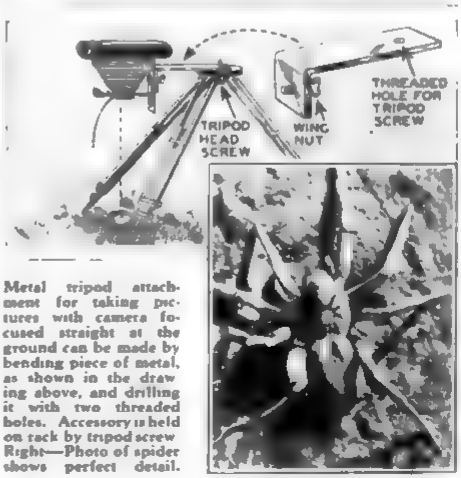
SCIENTIFIC motion pictures taken through a camera attached to a powerful microscope have disclosed the fact that crawling around inside every living human body there are billions of tiny, separate cells which look and act like the lowly amoebas living at the bottom of the water in small ponds or ditches.

These inhabitants of the human anatomy are not invaders, but belong there, being the so-called lymphocytes which creep slowly through the tubes that carry the lymph fluid; ultimately finding their way into the blood, where they become the white corpuscles of that fluid.

Tripod Accessory for Naturalist

THE naturalist often finds that to photograph one of his "finds" the picture must be taken with the camera pointed straight at the ground. Shown in the photo below is a simple little metal attachment which can be made in a few minutes. It will fit any standard tripod and hold the camera steady while taking a "strait down" shot. Accessory is readily detached and easily carried.

The best results are obtained even on bright days by stopping the lens diaphragm down to a very small opening, and giving an exposure of from 1/10th to 1 full second. Regulate distance by tripod height.



Metal tripod attachment for taking pictures with camera focused straight at the ground can be made by bending piece of metal, as shown in the drawing above, and drilling it with two threaded holes. Accessory is held on rack by tripod screw. Right—Photo of spider shows perfect detail.

OVER *the* JUMPS *with*

This unusual photo shows Maj. Chamberlin training Tan Bark to jump riderless, enabling the animal to jump freely and coordinate his own muscles without assistance from rider.

by **Maj. Harry D. Chamberlin**
U. S. Army
Technical Trainer, Olympic Equestrian Teams

In the Olympic games next month, stout-hearted American horses will enter international competition in jumping and "dressage" events in which marvels of training and horsemanship will be displayed. The army officer in charge of the equestrian teams explains the ingenious methods used in training his four-footed charges to shine in competition.

TAN BARK, a cold blooded little black Indian cow pony possessed of a stout heart, stepped gingerly over the small log that barred his path in the jumping pen. Standing near the center of the 60-foot-long oval, I flecked his hind quarters with a whip. The horse moved slowly 30 feet to a second similar obstruction, sniffed at the two fences confining him to the narrow track, and crossed the second log.

On around the track he continued and after a few minutes Tan Bark, having stepped over five such minor obstructions,

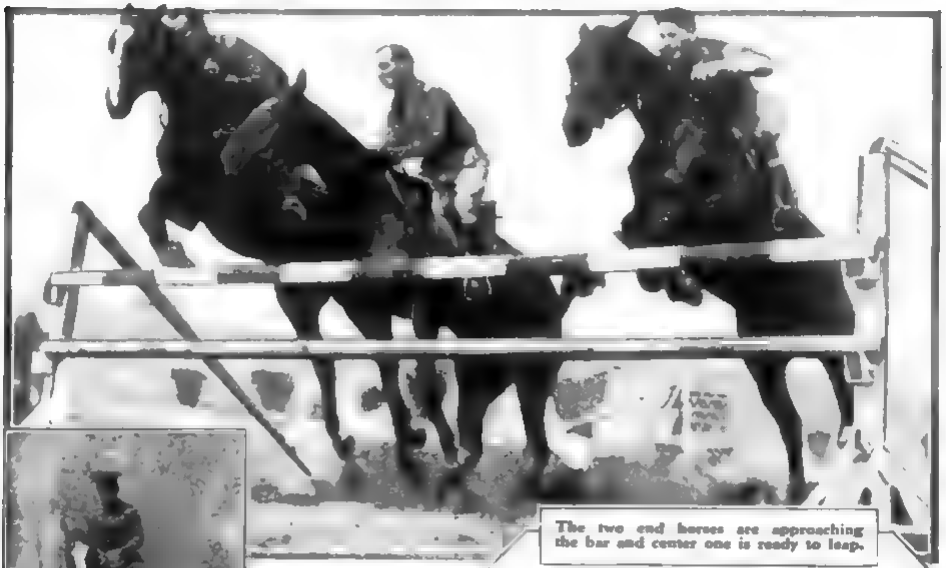
Maj. Chamberlin adjusts the cavasson, a steel-lined halter, on Tan Bark preparatory to "longeing" the horse over the jumps alone. The longe is the long halter cord. Steel lining on the cavasson prevents binding and injury to horse.

had had his first initiation in jumping. No one could have foreseen then that this pony, who had come as one of the government's $165 cavalry mounts to the United States cavalry school in 1926, would become one of the world's best jumpers; yet from such simple and unpromising beginnings have come many of our finest equestrian performers, staunch thoroughbreds whose stamina can carry them through three gruelling days of running, jumping and high school events demanding the utmost in muscular coordination; the half-thoroughbred jumpers that face unfamiliar barriers and take them without a halt; and the *dressage* horses, the even tempered stars of the show ring.

Stages of Training

Tan Bark continued his early "studies" in the jumping pen. Soon, encouraged by his trainer, he was leaping over slightly

Olympic Horse Stars



The two end horses are approaching the bar and center one is ready to leap.

At the left, a dressage horse "two-tracks" to the right—a difficult maneuver which requires the animal to move sideways. The horse's rider has three aids in guiding him—the hands, through rein and bit, pressure of the legs, and shifting of the weight. These three aids are sufficient to direct the horse through 60 different maneuvers.

A jumping horse covers from 20 to 30 feet in hurdling this obstacle, which in training can be adjusted to various heights.

higher obstacles; later across narrow and shallow ditches; finally over fairly wide ditches barred on each side by logs that required him to stretch across a fairly long distance as well as surmounting the elevated barrier.

Now he was ready for more difficult, higher jumps. A good jumper must learn early to use his head and neck properly, to jump freely, to employ all his muscles and to coordinate them himself, without the assistance of a rider. To aid in this development we put the jumpers over bars of varying heights, galloping them in a circle at the center of which stands the trainer and at one point of the outer edge of which is located the jump.

Mechanical Training Aids

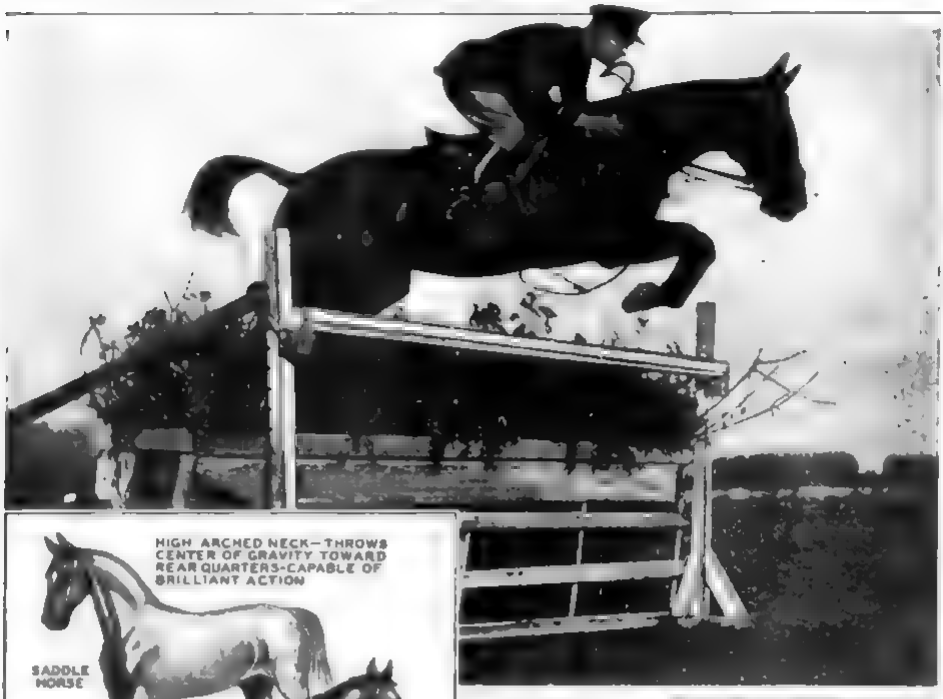
The animal wears a cavasson, a steel lined halter, to which is connected a longe, or halter rope, some 30 feet in length. With this device we can urge the horses over higher jumps than in the pen, since we have more control. I have seen Tan Bark clear jumps up to a height of six feet with no more apparent effort than he exhibited in stepping over the first logs.

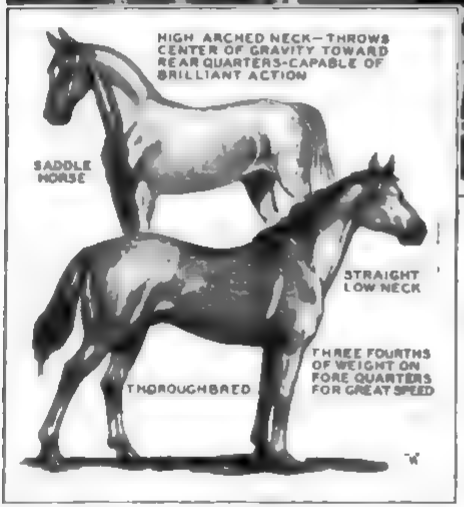
Throughout this training period Tan Bark was learning to relax completely and to rely in his trainer. We never violate the confidence of a horse, for each animal of the quality demanded for Olympic competition soon learns to place himself absolutely in the hands of his rider

True, we are dealing with dumb stars; but that makes our task of training them the more difficult. They are subject to the same reactions as human athletes. We need a keener understanding of the horses because they do not know their own abilities and we must do their thinking for them. No two are alike. One learns quickly, and by the same token forgets easily. Another plods slowly through his routine, but once having learned what is expected of him, seldom forgets.

Nine star performers will represent the

Center of Gravity Is Different for Saddle Horse and Thoroughbred





Difference between saddle horse, built for showy action, and thoroughbred, intended for speed, is shown in this comparative drawing. Differently located centers of gravity account for types of performance of the two breeds.

United States in the Olympic Games equestrian events at Los Angeles during August, fine athletic specimens that will be called upon to do every trick they know, from the *passage*, a highly collected trot of great brilliancy, to hurdling obstacles never before seen while galloping 18 miles an hour.

In essence, all follow the same routine of training. Daily the horses work out on two fields at Fort Rosecrans, the Coast Artillery station near the tip of Pt. Loma; yet those to enter the *dressage* events are not called upon to jump, while the jumpers need not train for the duration required of the animals entered in the gruelling three-day event.

Here Maj. Chamberlin is clearing a hurdle on Tan Bark, star jumper of the American equestrian team. Jumping horses place themselves absolutely in the hands of their riders, and their confidence is never abused.

For the first time in 12 years, the United States enters a *dressage* team. *Dressage*, a French term, merely means "training". In the 1920 Olympics, only simple movements were required. This year four new events, calling for performances never before demanded of American horses in these international contests, have been added.

Talents of a Dressage Horse

First, the *passage*. In this the horse trots while moving very slowly forward. From this, he slows down to the *piaffer* (pronounced pea-eff-a), or trotting in place. Again, he will be called upon to pirouette, or turn within the radius of his own length while galloping. Here he moves rapidly across the ring at a canter, slows to a gallop in place, then pivots on his hind legs while galloping with his fore legs. Fourth, he will change leads in various combinations, even to changing lead with every step.

In the case of the dressage performer, the trainer places him in such a position that the only thing he can do is execute the desired movement. The animal quickly associates his own with the movement desired through a stroke on the neck, or by being forced to repeat until a pat informs him he has succeeded.

Repetition comprises discipline and after a time a *dressage* horse becomes able to ex-

Such unusual hurdles as this are used in training. Note that the rider sits well forward to make things as easy as possible for his mount. The mechanical construction of horse places three-quarters of its weight on the fore-quarters.

press great energy without breaking out into a gallop. He may gallop 16 miles an hour across the ring one minute and move to a highly collected gallop the next, yet not so much as a muscular ripple will appear on his rider's body.

In training for such a transition as this, the animal first is moved from a normal gallop to a collected gallop only a little slower than his normal gait. Gradually, the two movements are executed farther apart, faster and slower, until at last the idea that the trainer wants two distinct gaits begins to percolate into the animal's consciousness. Then he will cooperate with his rider until in a few days he responds to squeezing legs and curling little fingers by drawing his hocks under his body and slowing in a trice from a 16-mile gallop to a highly collected gallop of five miles an hour, slightly faster than a walk.

How to Talk "Horse Language"

Beyond the apparent physical tricks of accomplishing these movements are the equestrian language—horse talk—and each rider's ability to impart his desires to his mount. All horse training, in fact, results from the use of horse language and any trainer's ability is limited only by his knowledge of that language.

Capt. H. E. Tuttle, in charge of the Dressage team, on Olympic. "Dressage" is a French word meaning training; dressage horses are called on to execute intricate movements.

We have three natural aids to guide any horse: the hands, reins and bit; the legs and weight. By using all these with different degrees of intensity we can produce an infinity of reactions. In the *dressage* events Capt. H. E. Tuttle teaches his mounts to execute 60 movements; yet I venture to say that no member of any team, American or foreign, will reveal to the crowds the slightest movement in directing his mount, so perfectly will he coordinate his own with the animal's muscular changes.

Oddly, the animals almost without exception display as soon as they begin to under-

stand what we want of them a mood receptive to our suggestions and a willingness to give more and more of their natural ability. The mechanical construction of the horse serves in large measure to place him in a certain type and enables us early to proceed with his training without the necessity of removing later a square peg from a round hole.

Head Position Affects Performance

Here is the idea: by his very build, three-fourths of his weight is on his fore-hand. If we want moves giving the appearance of lightness and delicacy impossible with the head extended, we elevate his head with the reins, thus throwing the center of gravity toward the rear. This tends to equalize the weight on his fore and hind feet.

This difference may be illustrated by a thoroughbred and a saddle bred horse. The thoroughbred is characterized by great speed to the front; thus his conformation is a straight, low neck. On the other hand, the saddle horse, capable of high and brilliant action, by holding his head high throws his center of gravity proportionately on his rear quarters.

Fitting Temperament to the Job

Our animals display all kinds of temperament. For *dressage* we require horses of even temperament. In executing the passage, his rider drives him forward with his legs yet his hands are set against his mouth and the animal cannot go forward rapidly. The result is that his energy boils up and he displays elevation in his leg movements and great brilliancy. A moment later he walks forward, held in check only by the pressure of his rider's little finger. Tremendous emotions curbed by a perfect understanding between human and animal!

On the other hand, we use horses of high energy for the jumps, as they have an opportunity to expend frequently their pent-up energy through the violent exercise of long and high leaps. The school horse, highly trained, must be submissive at all times irrespective of his inclination to bolt and dash away.

Not All Jumpers Thoroughbreds

These are the thoroughbreds.

Not all the jumpers are thoroughbreds, however. Tan Bark was a quite ordinary cow pony, yet four years after he joined the cavalry he was a member of the team winning the International Championship in Canada.

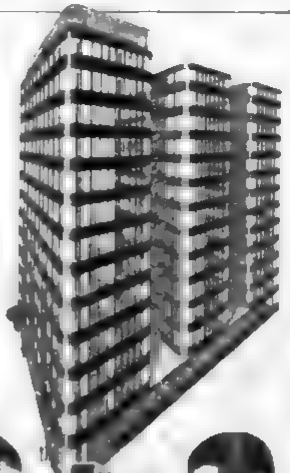
The remarkable feat any horse can attain in jumping formidable obstacles in full stride is always a matter of wonderment, even to those of us who are constantly with these fine animals.

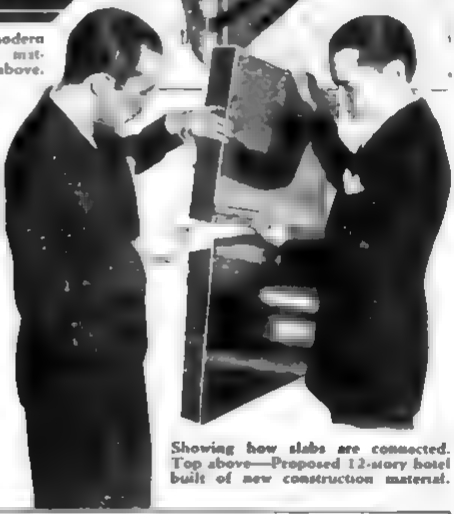
"For want of a shoe the horse was lost"—but not on the carefully inspected Olympic equestrian teams!

During the three day Olympic event, horse stars will be required to jump many hurdles such as this. Here Squire, with Capt. Duke up, shows perfect form as he curls his forelegs and straightens his hind quarters.

New MODES in Building Construction

When combined with indirect color-lighting of modern theater interiors, the glass and metal construction material offers a particularly fascinating effect, shown above.





Showing how slabs are connected. Top above—Proposed 12-story hotel built of new construction material.

The introduction and use of metal and glass as construction material has been hailed as the greatest forward step in architecture since the introduction of steel frame buildings. The lighting features illustrated on this page are but one of the many advantageous features of this new combination. Buildings can be put up in one-half the time and at a 20% saving in cost from the ordinary masonry. A 3-inch insulated metal wall has a heat retaining value equivalent to a 3-foot brick wall. The weight is only 1/10 that of a standard 12-inch brick wall. Slabs are factory built and are delivered in 4x6-ft. sections which are fitted together simply, as shown. Reflecting qualities permit unique lighting

Illuminated at night with "spots" and indirect lighting, these glass and metal buildings, shown above, reveal even more beauty than when glistening in the sun.

Latest in Home Conveniences—Chair and Bureau in One

Chair back and arm holds suit, drawers hold collars, etc.

WHAT might be quite correctly called a combination bureau and chair suitable for small apartments where space is at a premium, was displayed in the Ideal Homes Exhibition held recently in London.

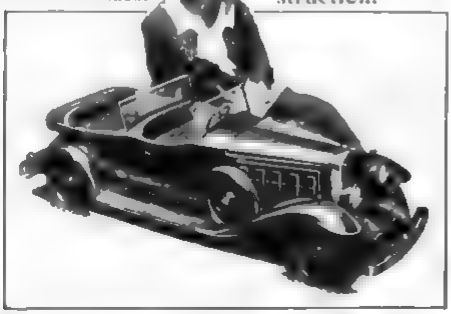
For your suit there is a form on the back of the chair which holds the coat without danger of crumpling, while the pants may be laid over an adjustable arm as demonstrated in the photo at the left.

What is most unique, however, is the addition of a pair of drawers that swing out from under the seat. Their purpose is to hold collars, collar and cuff buttons, and other small gadgets of wearing apparel. Somehow provisions for a bath tub seem to have been overlooked.

Builds Perfect Auto Model

ABOUT the neatest thing yet in the way of models was to be seen on display recently at a Detroit craftsman's exhibit. The Lilliputian touring car, shown in the photo below, attracted wide attention, and deservedly, for two years of careful effort and $1,000 in hard cash went into construction. Model was built by David Possen, of Detroit, and is perfect in every detail of construction.

Perfect in all mechanical details, this model touring car won first prize at Detroit, Mich., craftsmen's show.



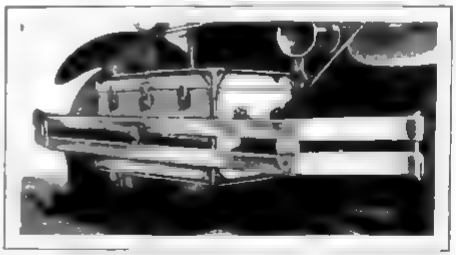
Cave Man 'Docs' Knew Their Stuff

APPROVAL of the skill and methods of ancient surgeons among the Incas and other prehistoric American peoples is expressed by Dr. Ales Hrdlicka, an eminent anthropologist of the Smithsonian Institution, in Washington, D. C. It even is probable, Dr. Hrdlicka believes, that these ancient surgeons knew something of anesthetics and of how to prevent the infection of wounds by germs.

Explorers have found in many places in North and South America ancient skulls and other bones showing traces of surgical operations, especially of operations to open the skull.

Many of the skulls show healing of the edges of cut bone, proving that the patients survived.

Bumper Trunk for Auto Tourists



Carried on bumper en route as shown here, auto trip trunk is easily convertible into a suit case at end of the journey.

IDEAL for tourists, campers, picnickers and the motoring public in general is an auto trip trunk which is now on the market. Designed for being carried on the bumper, which puts it thoroughly out of the way, it in no way interferes with the cooling system of the car.

When not being transported, the trunk is easily convertible into a suitcase—in fact it does duty as two ordinary suitcases. There's little danger from rain or heat from the motor, since the trunk is thoroughly waterproofed.

Mechanical Man Teaches Runners Best Racing Routine

MANY a promising newcomer on the cinder path has failed to come through because he could not learn to pace himself properly. Either he sets too slow a pace at the start and cannot take up the "spread" in his final dash, or he burns himself out at the start and hasn't enough left for the final spurt.

Shown behind the screen in the accompanying photo is a mechanical man which will aid distance runners in overcoming these faults. Having a controlled speed up to 60 miles an hour, the robot moves around the cinder path on a track, setting the pace for inexperienced runners. By the use of this device when training, the speed merchant develops his routine much faster and is trained to run a smart race.

Runners are taught the art of proper pacing when running against time by this mechanical robot which speeds around the cinder path on a track. Robot's speed is adjustable.

Musical Tube Produces 12 Notes

With this single musical tube it is possible to produce twelve notes and amplify their tone five or six octaves.

TWELVE different notes which may be amplified from five to six octaves can be produced from the single musical tube shown in the photo above. The device is a complex electrical hook-up, the notes and their amplifications being produced by the manipulation of the connections.

This strange new instrument, on which no one has been able to play tunes, as yet, was demonstrated recently before the Science Forum of New York.

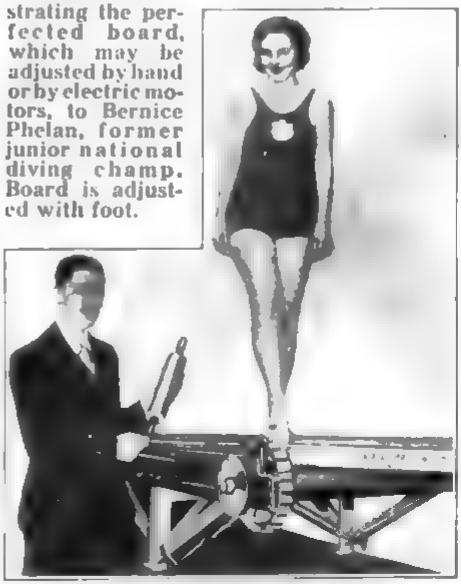
Storage Battery Like a Dry Cell

A NEW electric storage battery which can be sealed up tightly like the so-called dry batteries has been devised by M. Francois Boissier of Paris. This leakless battery has an outer shell of metallic zinc, a central rod of carbon, and is packed with an absorbent material soaked in zinc iodide.

Diving Board Set for Each User

THE stock alibi of rejected candidates for the U. S. Olympic diving team—that the diving board was either too limber or too stiff—was missing after the smoke of the battle for places had cleared away in the recent tryouts held at Los Angeles. The reason for this "unfortunate circumstance," which left the defeated practically without an alibi, was the use of a moveable fulcrum on board shown in accompanying photo.

Matt Handley, inventor, conceived the "rolling pin" adjustment while watching his mother roll out a pie crust. He is shown below demonstrating the perfected board, which may be adjusted by hand or by electric motors, to Bernice Phelan, former junior national diving champ. Board is adjusted with foot.

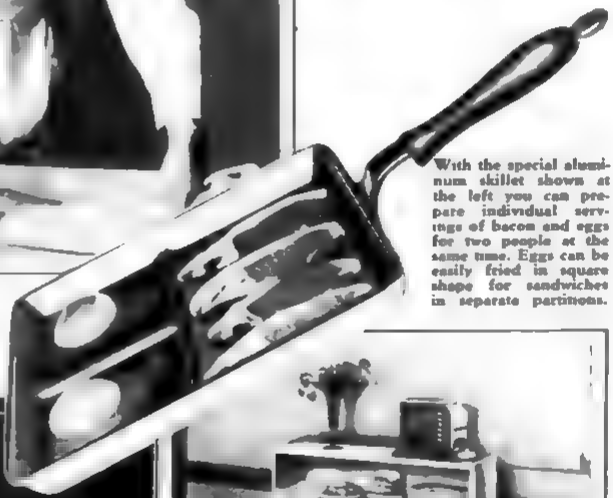


Equipped with a moveable fulcrum, this diving board has an adjustable spring which can be regulated to the weight of each user. Fulcrum was conceived from a rolling pin.

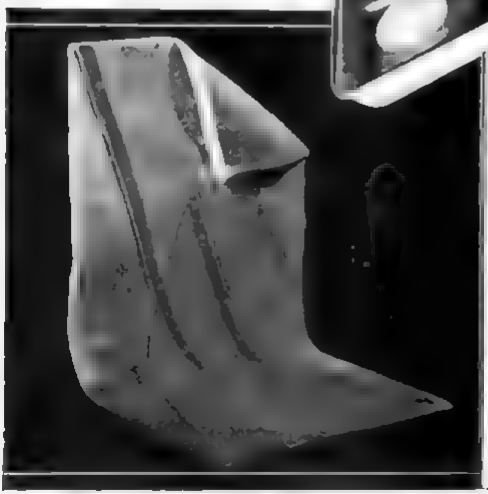
New Household Appliances

Heating element of cordless iron is controlled by thermostat. The electrical contact is made when iron receptacle is connected with prongs on the rest, effecting a sizeable saving in current consumption.

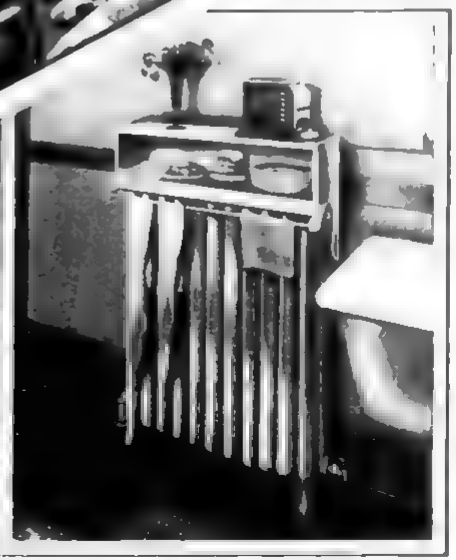
Here's a simple way to "de-juice" oranges. Metal device is pushed into fruit; when orange is squeezed, the juice flows out into glass, without making the slightest mess.



With the special aluminum skillet shown at the left you can prepare individual servings of bacon and eggs for two people at the same time. Eggs can be easily fried in square shape for sandwiches in separate partitions.

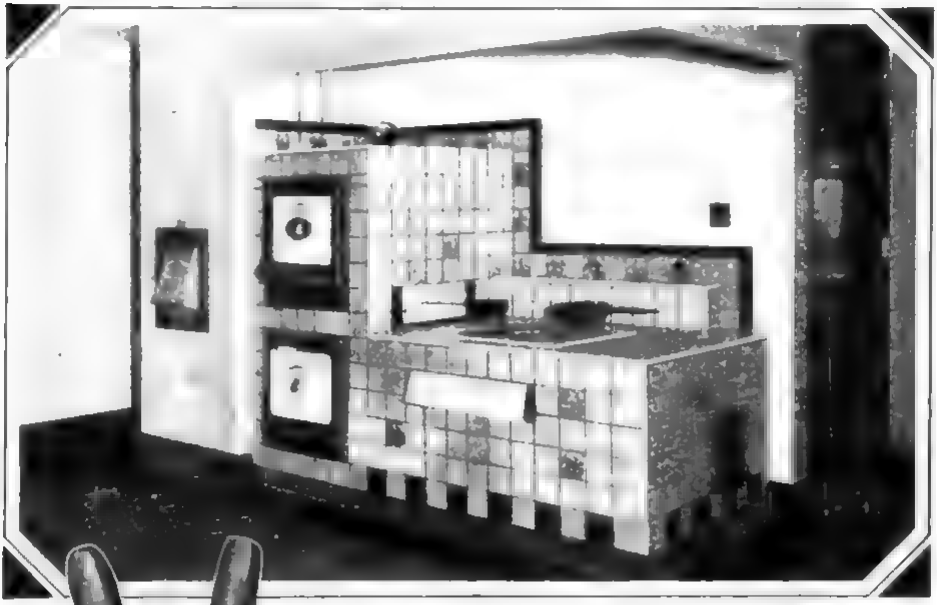


This new bathroom rug is made with a deep pile surface and a sponge rubber back so that it is non-skidding, non-wrinkling, resilient and well insulated. It is washable.



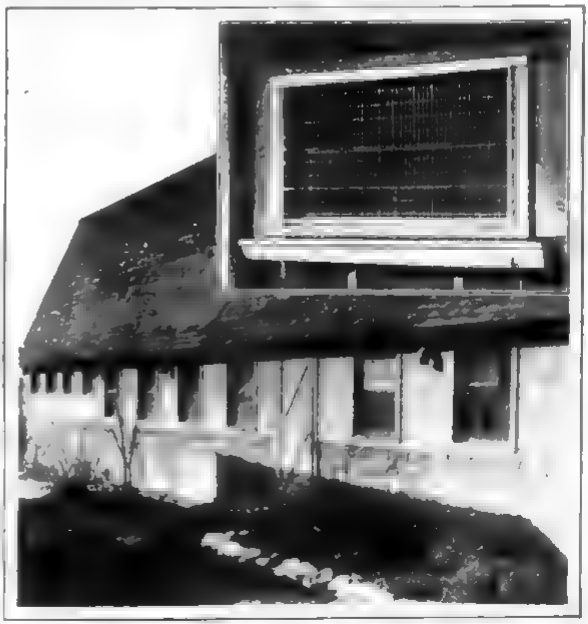
Made of heavy gauge steel, this cabinet fits on the bathroom or kitchen radiator, providing a handy place to dry small items and to keep towels, brushes and toilet articles.

Save Time for Busy Women



Decidedly new in kitchen equipment is this modern Dutch oven range. Two 18-in. ovens are set in tile framework, and one platform and four heating units are installed on the surface. All have automatic controls.

Women who do their own cooking can appreciate the usefulness of a utensil like that shown here, which combines the features of a fork and spoon. It can be used when working over a hot stove to turn the meat, for testing jellies, in fact, anything for which either a fork or spoon can be used. Being equipped with a hinge arrangement, it makes a practical tool for handling ice cubes. Handles will not get hot and burn the hands when working. Gripping handles clamps fork and spoon.



Bothered with flies in your kitchen? This screen has a current running through its wires which electrocutes insects but does not harm humans or animals. Dead insects fall into trough. Current consumption is negligible.

Radio, Phonograph and Talkie Machine in One Cabinet

The radio, phonograph and home talkie equipment in this cabinet may be used separately or together. The movie machine has its own projector, screen and sound apparatus.

A NEW combination instrument now on the market is more versatile than the famous one-man band. Enclosed in a neat wooden cabinet, shown at the left, is a radio, a phonograph, and a home "talkie" machine. The instrument may be used for phonograph music or radio reception individually, for talking pictures, or for silent pictures with either phonograph or radio music accompaniment.

The movie machine has its own projector, screen and sound apparatus. Movies from the projector are thrown against a mirror as shown, which reflects the picture onto a screen above the cabinet, thus reducing space.

List Best Foods for Vitamines

THE Committee of Foods of the American Medical Association has prepared a table of representative foods containing the six principal vitamines, lettered A, B, C, D, E, and G. For vitamine A, believed to be important for growth and to improve resistance to germ infection, the best source mentioned is butter.

Excellent sources of vitamine B, thought to be important to the nervous system, are wheat germs and asparagus. Raw, vine-ripened tomatoes, grape-fruit, lemons and oranges are the best sources of vitamine C, the one which prevents scurvy. Vitamine D, often called the sunshine vitamine because it may be generated by ultra-violet rays and which is necessary for the growth of the bones, is best obtained from cod liver oil. Eggs are also a source of this vitamine.

Wheat, either the wheat germ or the whole wheat grain, is the only obtainable source for vitamine E, believed to be necessary for reproduction. Finally, vitamine G, thought to be related in properties to vitamine B, has excellent sources in dried yeast, milk, eggs, liver and kidney.

Deceased Seen Reading Own Will

THE ceremony of reading the will of the lately departed may become a more lively rite with the aid of the talkies. A moving picture of the testator reading a recorded sound version of his own last testament would add dramatic interest to the ceremony and undoubtedly discourage heirs contemplating contest.

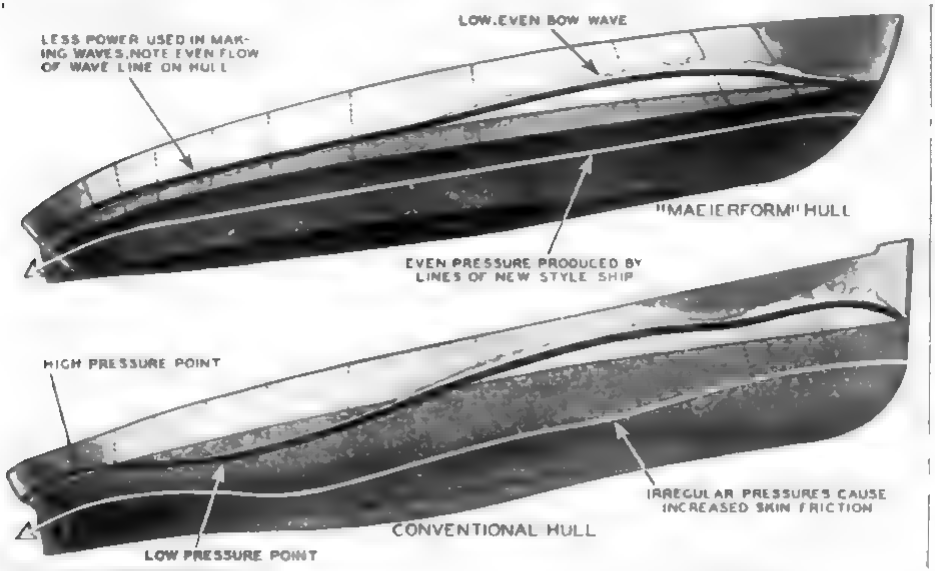
Talking contracts have already been accepted legally.

Game Tests Glider Pilot's Skill

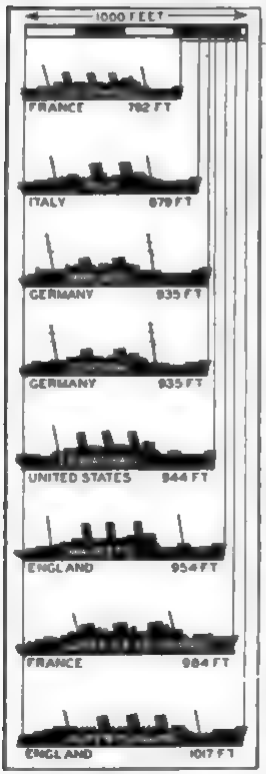
GLIDER pilots who can launch their ship into the air, sail down a mile-long course and then maneuver their glider into position so they can reach out with a small lance and burst a balloon, are now considered good! This novel sport was introduced at Hollywood during the pre-international contests. Photo below shows a pilot about to win his "spurs."

The glider pilot who can launch his plane, sail over a one-mile course and then spike the balloon is considered good.

New Ocean LINER Design Gives Speed



The so-called "Maierform" hull for ocean liners, shown at top, was designed by the German naval architect Maier, and is claimed to effect a 10 to 15% saving in power by the action of its triangular sides and flat bottom in smoothing out the flow of water, producing a much less exaggerated wave than the conventional type of hull.



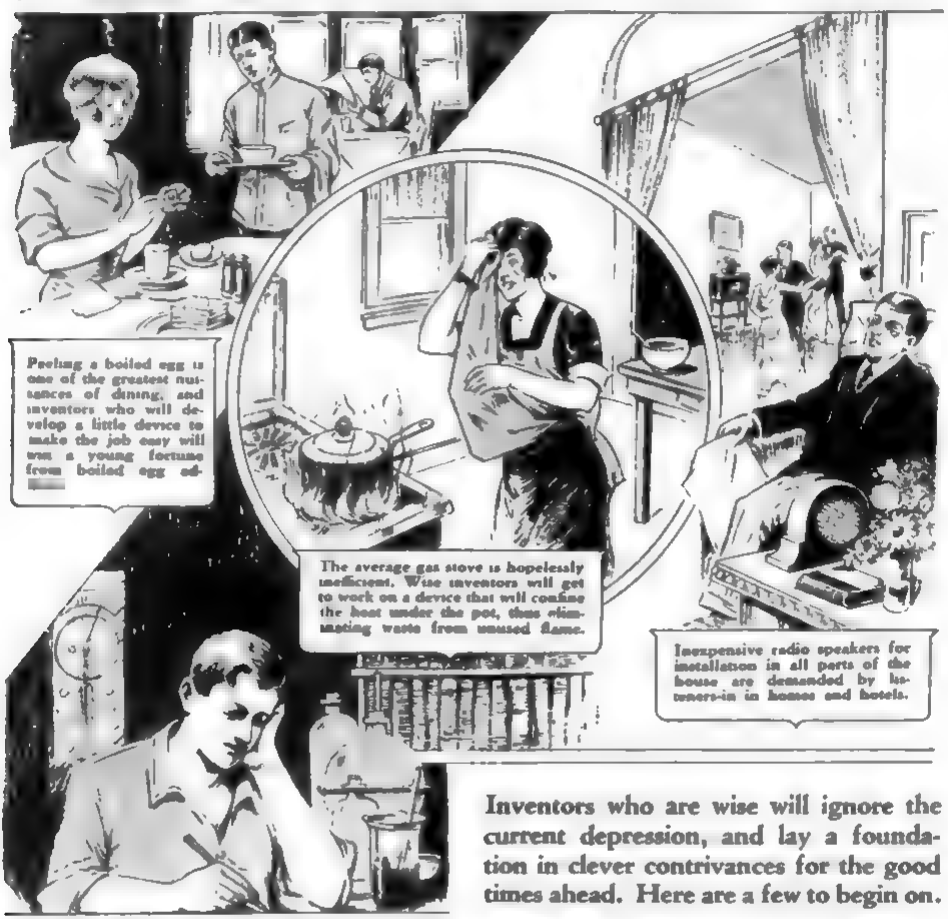
Giants of the world's ocean liners.

The bulb-nosed bow increases the liner's speed by creating a less exaggerated bow wave.

BUILDERS of great ocean liners, in an eternal quest for speed, have turned their attention to new hull designs with such success that the liner built even so recently as three or four years ago is a "back number" as far as its naval architecture is concerned.

To the German-built *Bremen* which holds the record for Atlantic crossings with a trip of slightly under five days, goes the credit for initiating much of the research on hull design. The *Bremen* is equipped with a bulbous nose, as illustrated in an accompanying diagram, which smoothed out the flow of water past the ship, and thus aided it in increasing its speed. High-flung waves cast from a liner's bow represent wasted power, since the energy expended in pushing the water aside contributes in no way to the forward motion of the ship. The latest advance in hull structure is the Maierform design illustrated above, so named from Maier, the German who conceived it. Its bottom is triangular, with a flat, wide keel, which results in an evenness of water pressure and a low bow wave claimed to effect a saving of 10 to 15% in power. It will be seen that the Maierform hull most closely approaches the ideal form, in which the transverse sections are triangular, with the apex at the bottom forming the keel. Such a design, however, does not afford sufficient longitudinal solidity and does not displace sufficient water to float the ship without a vital alteration of proportions.

Fortune Making IDEAS



Inventors who are wise will ignore the current depression, and lay a foundation in clever contrivances for the good times ahead. Here are a few to begin on.

DURING the last three months I have been highly gratified with the extremely practical and ingenious answers that I have been receiving and I have advised nearly thirty men to seek patent protection for their ideas.

Somebody is going to get rich, for even though we are passing through a great depression a large number of companies are seeking more than ever some clever invention that will give them new markets and new hopes.

1. Peeler for Boiled Eggs

Did you ever, by the way, peel a hard or soft boiled egg? Impatient people usually love to do this. If I were as clever as some of you fellows are I would design me a simple little device to do this—something so inexpensive that it could be sold in the five and ten cent stores—and then I would get me an axe, break this typewriter into a million bits and take a trip to Egypt.

Specifications: Should be made of pressed metal and should be so cheap that it can be sold retail for ten cents. Should be able to peel an egg in twenty seconds.

Exploitation: Should be patented in all of the countries of the world and should be sold strictly on a royalty basis.

2. More Efficient Gas Burner

I wonder if any of you fellows have ever stopped to think how inefficient a gas stove is? Did you ever wonder how much heat is dissipated needlessly by having the flames come up the side of the pot, thereby

for INVENTORS

by Raymond F. Yates

FOR INVENTORS WANTING ADVICE

Mr. Yates, who conducts this department for inventors, stands always ready to give advice on patent, law and marketing procedure. When requesting advice, however, do not send models as they will not be accepted. All that is necessary is a clear drawing and complete constructional data. Stamped return envelope must be enclosed. Address Mr. Yates in care of Modern Mechanics and Inventions, 529 So. 7th St., Minneapolis, Minn.

permitting a large portion of the heat to radiate into the atmosphere?

Of course, if we stop this, and inclose the burner in such a way that none of the flame escapes, we smother the flame and it goes out. However, there is a way in which that may be done and I am going to leave it to you.

Specifications: Should not add a great deal to the cost of a stove and should apply all the heat produced by the flame directly to the bottom of the pot. Elimination of waste will cut fuel costs immensely.

Exploitation: Should be patented in this country only owing to the fact that gas stoves are used little in Europe.

3. *Radio Speaker for Every Room*

The only thing that prevents many families from having a loudspeaker in every room is the fact that good speakers are too expensive, ranging in price from five to twenty dollars. Why not a good speaker for one dollar?

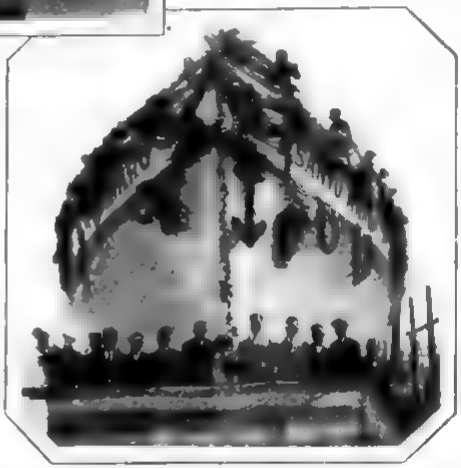
I'll admit that a good speaker cannot be built for one dollar if the dynamic principle now used is employed. But why use this principle; why not get a new principle? This is not as difficult as it might sound to the inexperienced person. I could sit down and mention a dozen possibilities and I think that any experimenter reading a standard textbook on the subject will agree with me.

(Continued on page 176)

Modern Tuna Fishing Boats

Disaster and adventure frequently overtake the tuna boats on the high seas. The "Mariner" (now the "Patria") was recently struck by an oil tanker, but made port with this gaping hole in her side. She was repaired and now sails again.

A tuna boat with a deck load alongside the bait boxes after a heavy run.



Elaborate ceremony attends the launching of a fishing boat. Here you see the "Santa Amaro" bedecked with garlands, with her crew standing in front. Costing almost $100,000, the Santa Amaro is 120 feet long, and can cruise 8,000 miles before making port. Profits paid for her in 3 years.

FISHING for tuna—commercial yellowtail and the more sporty skipjack—by the 400-odd crews manning the fishing fleet of Southern California, offers the double thrill of a hazardous physical enterprise and one of the most speculative means of earning a living known. Hundreds of miles from their bases at San Diego and San Pedro, sometimes as far south as Panama, the crews battle Pacific storms which frequently threaten either to take their lives, or, at best, to wipe out their rapidly earned fortunes.

Not long ago the *Mariner*, a 115-ft. Diesel engined fishing boat—one of the largest and most modern in the fleet—was returning from a fishing cruise off West Mexico when without warning an oil tanker crashed into her starboard side. A gaping hole 11 feet wide and 10 feet deep threatened to sink the sturdy craft, and her crew, unable to see the length of their boat ahead, turned to and built temporary bulkheads which kept the boat afloat until she reached port.

Boats Carry All Modern Equipment

Today Captain Joe Medina, skipper of the *Patria* (until that crash in the fog she was called the *Mariner*) considers himself one of the most fortunate of fishermen, since the boat reached port instead of going to the bottom. Medina, whose three brothers fish with him from the *Patria* as members of the crew, has seen his fortune build up almost overnight through handsome returns from the sale of tuna to canneries.

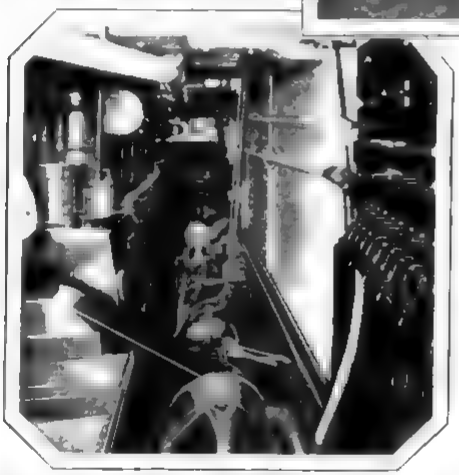
Now, when one of the larger tuna boats clears customs for the high seas, the craft carries an able crew and all the known modern conveniences for safety, for navigation, for scientific search of tuna schools, and for transport of a highly perishable cargo. Each has installed fine dual engines and refrigeration machines, the latter not to make ice but to conserve the 50 tons of crushed ice carried south to pack the valuable cargo.

Many of these large boats, which range up to 120 feet in length, have paid for themselves during two years of fishing. The first large boat was the *Atlantic*, of which Manuel Medina was the owner. Medina paid for the boat from earnings in two years and has invested since 1926 $20,000 in outside properties. The *Atlantic*, 110 feet long, carries a crew of 10, cost $70,000 and goes out for fishing 10 times a year. These trips average

Wrest Fortunes from the Sea

Seining for sardine bait before clearing out for run south for tuna.

Here's where the profits of tuna fishing come in—Above is seen an $8,000 load of yellowtail flowing on automatic conveyor from a fishing boat to a cannery. In normal times, yellowtail brings $120 a ton, skipjack about $80 a ton.



Inside the engine room of a modern tuna fishing boat is a veritable maze of machinery. Above you see the 400 h.p. Diesel in the "Navigator," one of the largest of the fleet. Refrigerating equipment to preserve fish is indispensable.

three weeks in the fall and from four to five weeks in the winter and spring.

Some of the larger boats cost up to $100,000 and each trip out for tuna involves an expense of $1,600 exclusive of the general boat overhead, which includes insurance, overhaul, carrying charges for unpaid bills, etc.

The tendency in this highly speculative enterprise runs to bigger and bigger boats. The largest now under construction but not yet named, will measure 122 feet in length and carry 17,000 gallons of crude oil as fuel for her Diesel engine. This craft, built by George Campbell, is his 38th contribution to the fishing fleet. She will be able to cruise 8,000 miles before making port.

Tuna fishing off Southern California began in 1909 and until 1924 the largest boat was only 60 feet long. The men then engaged were Austrians, Sicilians, Portuguese, Japanese and a few Americans. During the first 15 years these men earned a meager living from the "trade".

Five years ago a group of Portuguese at San Diego built an 82-foot boat called the *Abraham Lincoln*. Shortly afterwards another Portuguese built a 100-footer—then the race was on. Boats increased rapidly in size up to 120 feet and now from San Diego alone 52 of these large boats, costing from $40,000 to $100,000 ply the Pacific around the year in search of tuna.

Crew Gets Two-thirds of Proceeds

As a whole the boats are money makers although, as elsewhere, some crews are not successful, largely on account of their inefficiency.

The percentage of successful boats and owners is far ahead of the ordinary average of successful ventures in any one line of business, however. Where formerly $125 a month was a good wage for a fisherman, successful boats average for the crews $300 monthly or better.

Each man shares proportionately after expenses are deducted. The boat takes one-third and the crew two-thirds. From his one-third the owner pays upkeep, insurance and other overhead. Most boats have been paying themselves clear in three years. Ordinarily when building the owner goes in debt for three-fourths of the value of a boat, insures it at $7.00 a hundred for its

(Continued on page 178)

Starting Gate Prevents Sprinters From Jumping the Gun

Gate, which is dropped down in front of the runners when starting signals are being given, is lifted, as shown in lower photo, simultaneously with the shot of starter's gun.

REALIZING that a great deal of a sprinter's energy is spent in the get-away, track coaches over in England are experimenting with a new starting gate with which they hope to prevent restarts caused by over-eager athletes jumping the gun. It naturally follows that the 1-yard penalty, which is often the margin between victory and defeat, will also be eliminated.

The gate, which resembles that used for starting horse races, is dropped down, as shown in top photo on left, when entries are "toeing the mark". When gun is fired, the barrier flies up automatically, allowing runners to leap out.

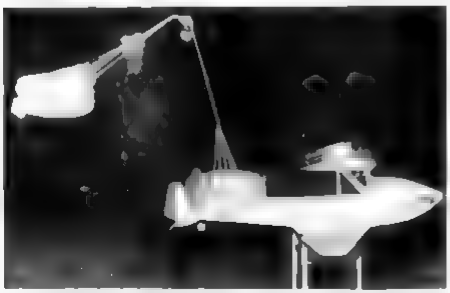
Lead Made to Conduct Electricity

AN AMAZING discovery pointing to lead as a super-conductor of electricity has been announced by Prof. J. C. McLennan of University of Toronto. Conductivity was improved by 10 million cycle current.

Plane Cabin Has Own Parachute

AIRWAY passengers won't have anything to worry about when something goes wrong while flying 30,000 feet, or so, up in the clouds if the model sliding cabin, shown below, is perfected.

Ben Ayad, French inventor of the device, claims that in case of danger, by pulling a cord the cabin will slide from its natural position to the tail of the plane. Simultaneously, a parachute will be opened which will lift the cabin from the fuselage.

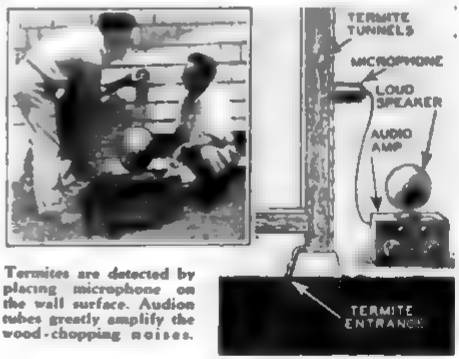


When something goes wrong with plane, cord is pulled which releases parachute as cabin slides back on fuselage.

Audion Detector Finds Termites

GEORGE W. EDGERTON, California inventor, has perfected a machine that locates termites (those wood-consuming insects which destroy millions of dollars worth of homes annually by consuming the wood between the walls) about as easily and efficiently as a compass tells us which direction is north.

The apparatus, shown below, locates the pests by sound. When microphone is placed against floor or wall, their wood-chopping operations, inaudible to the human ear, are picked up, amplified many hundred times through four audion tubes, and projected from a loud speaker, coming out like the noise from a boiler factory. No noise means no termites.



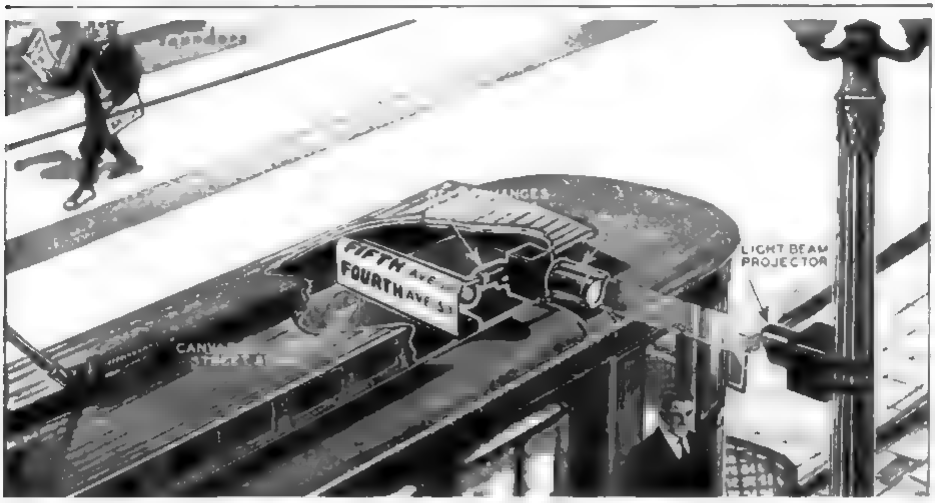
Termites are detected by placing microphone on the wall surface. Audion tubes greatly amplify the wood-chopping noises.

Radio Heat Kills Malaria Germs

HOW radio heat helps drugs like quinine search out lurking germs of malaria tucked away in nooks and corners of the infected body, and to kill these germs otherwise unreachable so that the disease is cured, was explained by Dr. C. F. Tenney, Jr., in a recent address at a symposium of the New York Electrical Society.

There has been developed an apparatus resembling a radio transmitter which sends radio waves through the human body causing an artificial fever; raising the temperature to 102 or 103 degrees. When heat was administered at the same time as a dose of quinine the malaria did not return.

Practical ANNOUNCER *for Street Cars*



Light beam from projector mounted on lamp post strikes photo-electric cell, actuating solenoid which turns up canvas roll sign to name of next street. Projector is set in middle of block, to allow time for passengers to make ready for debarkation.

AT LAST the long-awaited perfect street announcer for trolley cars has arrived. What finally solved the problem was the all-purpose electric eye.

How the announcer operates is illustrated in the drawing above. In the middle of each block there is mounted a projector so focussed that when a street car passes the light will strike the hooded electric eye on the car. Current generated in the cell then automatically closes a relay which in turn operates solenoid to rotate the canvas sign on which the street names are painted.

The light source is mounted far enough ahead in the block so that people seeing their street announced on the sign will have time to pick up their packages for debarkation. The contrivance requires a minimum of attention for accurate operation.

What Has Four Hands, No Legs?

THAT monkeys have four hands each, instead of four feet each, has been decided by a British customs court. The new British tariff provides that "quadruped animals" are to be admitted duty free, this clause presumably being intended to provide for such animals as cattle and horses.

The importers of the monkeys insisted that these, too, were four-footed and should be admitted under the quadruped clause. Custom officials took exception to this interpretation and insisted, on the contrary, that monkeys could not be quadrupeds. The court accepted the latter view and ruled that monkeys are four-handed, not four-legged like cows or horses. Possession of thumbs made the monkeys four-handed.

Device Answers Phone and Tells Caller When You Will Return to Office

A PIECE of office equipment long needed by business men is a device to answer the phone when no one was about the premises. A device called by its inventor, R. P. Phillips, of Tyler, Texas, the "Ansophone" has now been developed to fill the bill.

The basic elements of the "Ansophone" are a telephone and an instrument closely resembling a dictaphone. When the party wishes to leave the office he talks into the latter instrument, telling it what time he will return, or where he can be reached, then sets the phone for operation.

Should a person call during absence of the business man, the speaking device will automatically go on the line and tell the party calling what the business man told it to tell.

Business man tells "Ansophone" when he will return, and the instrument tells this to person calling during absence.

SOLVING *the* MYSTERY

Milk cans being lowered into ice well built by Canadian dairymen during the winter.

Outstanding attraction at Ranier National Park is this huge ice cave, hollowed out of the Paradise glacier by movement of colossal ice mass over the earth. Height is 20 feet.

Dairymen build ice wells to preserve milk, vegetables, etc., by digging pit in ground, boarding up sides, and pouring in little water each day during winter. Large block of ice thus accumulates which lasts throughout the summer.

by CALVIN FRAZER

Outstanding among the phenomena of Nature are the amazing ice caves found in various parts of the world. Until recently science was mystified by the fact that in them the thick layer of ice on the walls and floor form in heat of summer, but disappear in cold of winter. Read here the explanation of this apparent violation of Nature's laws!

ON a scorching summer day a few years ago a party of explorers entered a cave opening from the volcanic crater of Cerro de la Bandera, in New Mexico, and discovered an enormous mass of ice. The temperature of the air in the cave was found to be at the freezing point.

This "ice cave" is the most southerly one yet found in the United States, but many are known in the northern states as well as in the temperate latitudes of the Old World. For centuries such caves have been local wonders in this country and abroad.

In many but not all of them ice is found in summer, when hot weather prevails outside, but little or none in winter. There was once a good deal of controversy among scientists over this mystery, but the following explanation is now generally accepted:

Cold air is denser and heavier than warm. In winter such air flows into the cave from above. It is warmed by contact with the walls of the cave, grows lighter, and is displaced by a fresh supply of cold heavy air from outside, and this process is repeated until finally the walls themselves have been chilled to a considerable depth.

# of NATURE'S ICE BOXES

One of the most astounding phenomena of science is this natural ice cave in volcanic crater in New Mexico. In summer time layer of ice forms in walls and floor, sometimes a yard thick, and disappears entirely in winter Unusual air currents within the cave account for this freak

When this stage is reached circulation ceases and a mass of cold, stagnant air fills the cave.

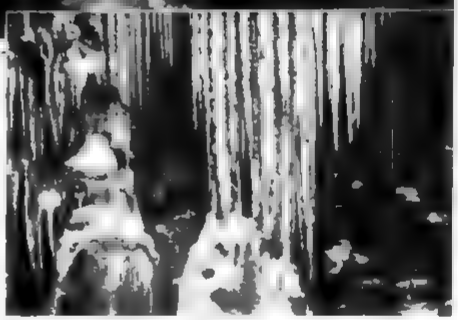
In summer, as the air outside is warmer and lighter than that in the cave, it does not enter the latter. Thus through the summer the cave air is warmed only very slowly, by gradual diffusion and the conduction of heat through the overlying soil and rock.

In spring plenty of water from melting snow and other sources seeps through the ground after the latter has thawed out, and finds its way into the cave, where, on account of the presence of cold air, it turns to ice. By the end of summer the cave air has become warm enough to melt this ice, which therefore disappears.

Still later in the year, though the cave air is again cold, there is no water in the cave to form ice, because, though there are mild periods in winter when the surface waters are not frozen, the water cannot seep through the frozen soil.

Farmers Profit From Ice Wells

The natural process embodied in the ice cave is utilized in the device known as an "ice well." This consists of a pit in the ground, with boarded sides and a layer of gravel at the bottom to ensure good drainage. The pit is provided with a tight removable cover.

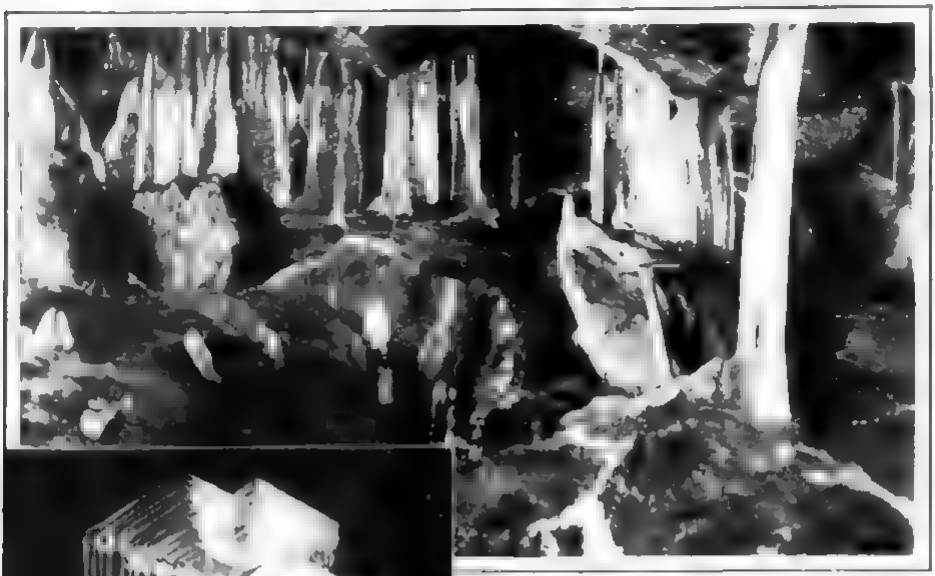


The Edison Ice Cave, in Oregon, displays these freakish ice columns, which hang from the ceiling during the summer, but disappear during the frigid winter months

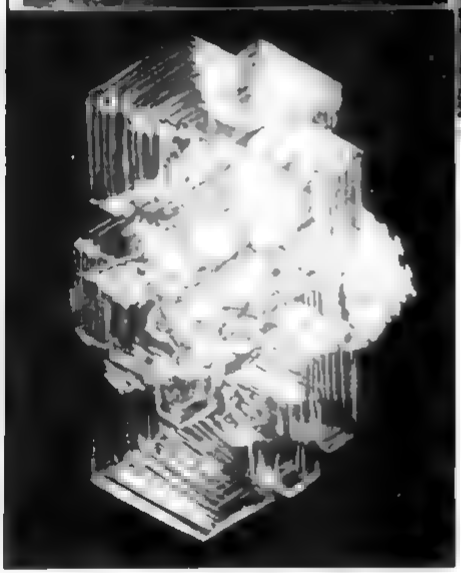
During freezing weather in winter a little water is run into the pit each day, until a large block of ice accumulates. The ice lasts through the summer and the space above it provides cold storage for milk, vegetables and other perishable foods. Several of these cheaply operated ice-boxes are in use on dairy farms in Canada, and one constructed three years ago by the U. S. Department of Agriculture at Mandan, North Dakota, has proved a great success.

One of the most celebrated ice caves in the United States is the Coudersport Ice Mine, located a few miles east of Coudersport, Pa. This so-called "mine" owes its name to the fact that when prospectors were digging on the spot in search of silver they discovered deposits of ice and jokingly remarked that they had found an ice mine instead of a silver mine. The miners

Ice Crystals 1½ ft. in Diameter, Icicles 2 ft. Long Found in Ice Caves



Most celebrated ice cave in the United States is this Coudersport ice mine, discovered by silver prospectors. Some of icicles shown measure over 25 feet in length. Ice columns are formed by spring rain water seeping through roof and being frozen by cold air of the cave.



Most amazing in design is this strange ice crystal, 18 inches in diameter, found in Kungur Ice Caves in Ural Mountains, Russia. Resembling enlarged snowflakes, these crystals are hollow and encrust the walls of the cave.

made a vertical shaft 40 feet deep, on the walls of which masses of icicles, some of them 15 to 25 feet long, form each spring, last through the summer and disappear on the approach of winter.

Ice caves are of scientific interest not only on account of containing ice out of season but also because of the many strange forms this ice assumes. The cave of Chaux-les-Passavant, in France, which has been celebrated since the sixteenth century, was visited by the late E. S. Balch, the leading American student of ice caves, who wrote of its condition in the middle of August:

"The bottom of the cave was entirely covered with a flooring of ice. How thick this flooring was there was no means of judging, as there were no holes, but it must have been at least two or three meters thick in places. At the back of the cavern, directly facing the entrance, one magnificent frozen waterfall streamed from a fissure. It was perhaps five meters high.

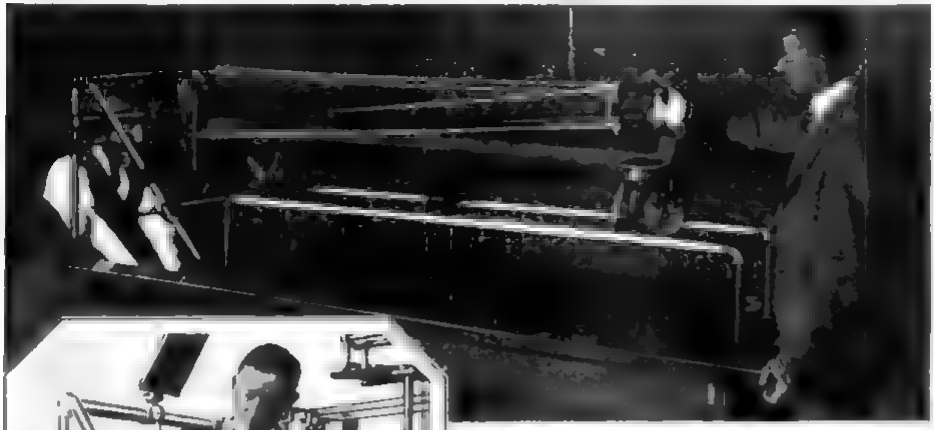
"Perhaps the most remarkable feature of all was six or seven great stalagmites, shaped like cones or rough pyramids, which rose on the floor of the cave. One of these was at least five meters in diameter and six in height, and seemed perfectly solid."

The Lur cave, near Peggau, Austria, is remarkable for rare formations known as "ice-clubs"; slender shafts of ice, rising from the floor of the cave, with a club-like enlargement at the top of each.

Crystals in Ice Caves 18 Inches in Diameter

Most wonderful of all are the huge ice crystals found in the famous Kungur ice caves in the Ural Mountains, recently explored by an expedition from the Hydrological Institute of Leningrad. These crystals, some of which are 18 inches in diameter, are the largest single crystals of ice yet discovered anywhere in the world. They are similar in design to the tiny crystals that, singly or in clusters, form our winter snowflakes, but unlike most ice crystals they are hollow. They encrust the walls of the caves after the manner of hoar frost. One of these amazing crystals is shown in the photo on this page.

Camera Records Reading Faults of Eyes



Here is shown a patient "clamped" in position for eye test.

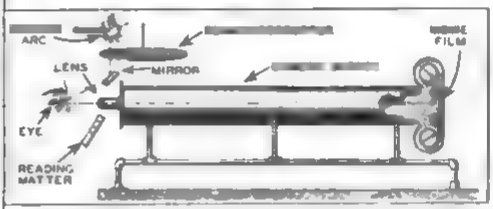
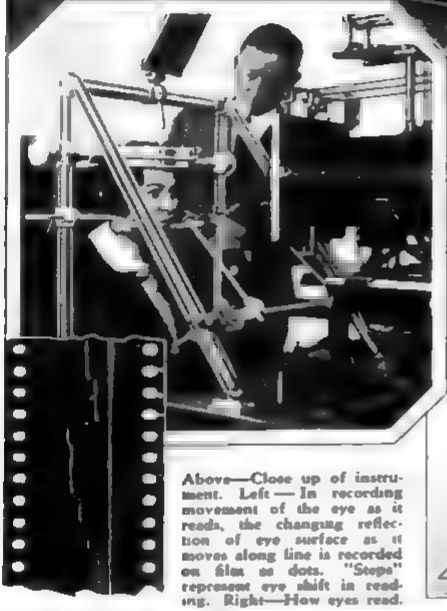
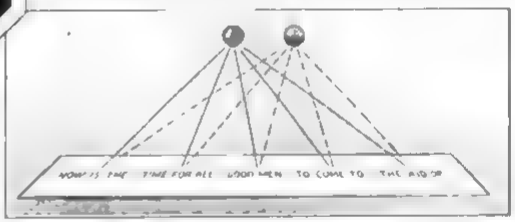


Diagram shows operation of eye movement detector device.





Above—Close up of instrument. Left — In recording movement of the eye as it reads, the changing reflection of eye surface as it moves along line is recorded on film as dots. "Steps" represent eye shift in reading. Right—How eyes read.

IF YOU were seated before an eye movement detector reading printed lines, you would discover that your eyes do not sweep smoothly across the page. Rather, they move forward in jerks, making about five pauses to the line, then sweep back to the new line in one movement.

These irregular movements are recorded on a 20-ft. strip of movie film in the new eye movement apparatus, shown above, and betray reading faults. It was built under the supervision of Miles A. Tinker, assistant professor of psychology at the University of Minnesota. Too many "jerks" or "runbacks" to line showed defective reading habits, Mr. Tinker discovered.

When making the experiment, the subject is seated at one end of a long tube in a room painted a dull black to prevent undue reflection. A forehead rest is clamped on the head and cheek supports are used to prevent unnecessary movements. The subject also wears spectacle frames on which a tiny metal bead is soldered so that any head movement will reveal an irregular vertical line on the film.

Light from a carbon arc lamp is projected through a tiny hole in the wall from an adjoining room. The small beam is sent through a revolving disc which breaks up the light into 50 flickers per second and is then projected through a blue glass to reduce the intensity. Interrupted beam is reflected into subject's eyes by the use of small mirrors.

Since the reflection on the eye surface changes direction as the eye moves during reading of material exposed just below 5-ft. camera barrel, this movement, enlarged five times, is recorded as a series of tiny dots on the film, as shown above.

New "Zoom" Lens Gives Detail to Long Distance Photos

Equipped with the "zoom" lens, camera can take detailed aerial photos from a 30,000 foot altitude. Lens is adjustable by moving, by remote control, lens lever attachment

AERIAL photographs taken at an altitude of 30,000 feet reveal the same detail as those now shot from a 5,000-foot level through the development of a new "zoom" lens which fits the standard picture camera.

The operation of this lens in adjusting its focus is so simple that the pilot photographer in a single-seater plane can change to telephoto adjustment, and vice versa, by merely moving, by remote control, a small lever attached to the lens.

Besides being widely recognized as useful in taking war pictures, this lens is also adaptable to peace-time purposes, since pictures taken at 3,000 feet — minimum altitude set by the Dept. of Commerce — have detail of a 600-foot shot.

New Rust-proof Alloy Discovered

THE discovery of a cheap new alloy made of iron and aluminum was reported at a recent meeting of the American Institute of Mining and Metallurgical Engineers. The discoverers claim it will not rust when alloy is red hot. Red hot rust is what shortens the lives of furnaces, etc.

Invalid's Wheel Chair Motorized

BEDRIDDEN for 11 years, Byron Jones, of Midvale, Utah, now travels about in a motorized wheel chair devised by Henry Anderson and Alden Sorenson of that city.

The wheel chair is propelled by a ¾ horsepower gasoline motor attached to the back of the chair, and has fingertip controls for the brake, clutch and steering apparatus.

With all controls at his fingertips, invalid "tours" about in his motorized wheel chair powered by small gas engine.

Artificial Hand Has Human Action

LIFTING twenty-five pound articles or handling eggs are equally easy tasks for the wearer of the new artificial appliance which duplicates the gripping strength, appearance and action of the human hand.

Delicate, yet powerful, gripping strength is produced by a combination of resilient rubber fingers and thumb with a powerful lever operating mechanism. When attached, appliance is operated by the natural body control which resembles the muscular control of the human hand and gives it such a delicate touch that eggs can be picked up and handled without being broken. Fred C. Henning, of Chicago, is the inventor.

Operated by the natural muscular control, this artificial hand picks up eggs and 25-pound weights with equal ease

Piano Wire Records Building Sag

M. ANDRE COYNE, French engineer, has advocated the installation of stretched wires in iron pipe embedded in the walls of concrete buildings. The reason for this is that the wires will have a distinct "sing" which will vary whenever the structure moves, due to sagging or excessive wind pressure.

"Umbrella" Hat For Sun or Rain Is 27 Inches in Diameter

DESIGNED as a protection against rainy weather or the sun's rays, the "umbrella" hat, shown in the photo on the right, is probably the largest piece of headwear ever put into practical use. It measures 27 inches in diameter and was designed by a St. Louis millinery stylist.

The hat is re-enforced with an oil cloth material of sufficient strength to make it waterproof. It is also ribbed so that it can be folded up and carried like an umbrella when not being worn.

This "umbrella" hat measures 27 inches in diameter and is the largest piece of headwear ever put into practical use.

Gun Sling Winds on Reel in Stock

When not in use, the gun strap winds on reel inside the stock.

A GUN sling or strap that winds itself onto a reel [illegible] in the end of the stock by a spring action similar to that of a flexible measuring tape is now on the market.

To use the sling, adjustable strap is pulled out and fastened to hook near barrel. Photo above shows strap almost completely wound onto reel which is fitted into a metal casing in the base of the stock. Removable plate permits adjusting.

Robot to Replace Human Teachers

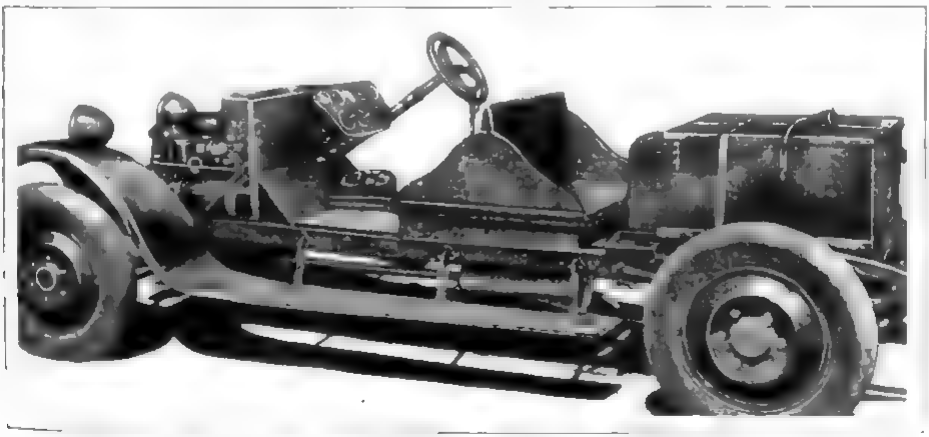
MECHANICAL schools, in which motion pictures, phonographs, radio broadcasts, laboratory apparatus and other scientific contrivances will largely take the place of teachers, have been predicted by Sir Michael Sadler, famous British expert on education.

This method will be only possible in the higher grades where pupils have learned how to profit by study. Here the human staff will be reduced to a few trained specialists who will operate the devices. Lower grade pupils require personal contact.

Electric Car Generates Its Own Power, Goes Forty-four Miles Per Hour

PUTTING on the brake while driving down a hill only means slowing down the speed of our car to most of us. Not so with Josef Sousedik of Prague, Czechoslovakia, when driving his newly patented electric automobile shown in the photo below.

Going down hill with the brake applied his car produces its own electrical energy which is used as impulsive power for further driving. Should the power thus generated be insufficient, a small explosion motor can be brought into action. Though the inventor is still making further improvements on the car, it has already been clocked at a 44-mile-an hour speed.



The electrical energy generated when this electric car is driven down a hill with the brake applied is used as impulsive power for further driving. Small explosion motor can be used when energy thus stored up is insufficient.

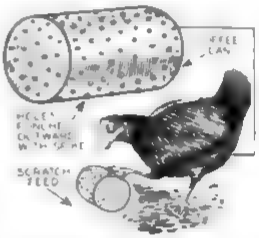
HANDIKINKS

Handikinks department is the place to look for labor-saving stunts and ideas which are easily made, and which will aid you in performing tasks about the home, garden, garage or workshop; in fact, anywhere there is work to be done.

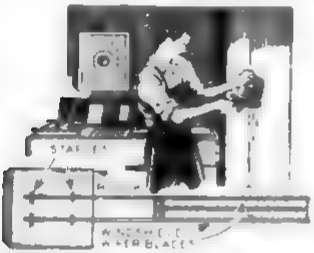
Novel Cooling Attachment for Electric Fans

THE cooling power of your electric fan can be about doubled by wiring a tin can to the bottom of the fan frame, as shown, and inserting a piece of blotting paper in the can which is filled with water. Paper acts as a wick and cooling effect of water is spread about room when fan is turned on. Canister may be painted, if desired.—Alen Nichols.

Poultry Scratch Feeder



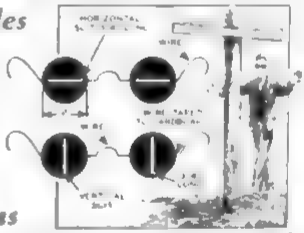
COFFEE cans can be quickly manufactured into handy scratch feeders for poultry by perforating them with spike holes. All holes are made from the inside so that when can is filled with grain, revolving it will cause feed to drop out. This is more effective than hopper feeding as hens eat more slowly.—Chas. H. Willey.



Wiper Blades Remove Moisture From Films

AMATEUR photographers who develop their own films will find two new windshield wiper blades fastened face to face on a block of wood, as shown on the left, a great help in removing surplus moisture from films. Device is nailed on wall or table in dark room. Films pulled through this device will not show water spots and, when hung up, dry in half the usual time.—Kenneth Murray

Tricks With Spectacles

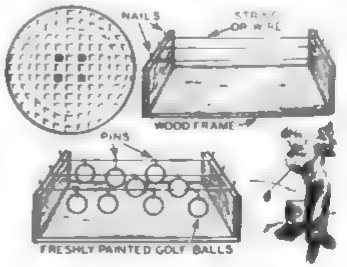


WANT to have some fun? Then make these curious spectacles shown on the right. Lenses are black cardboard disks 1 inch in diameter with cut slots, as shown, ¼ inch long and about 1 16 inch wide. Fine wire frames are taped in place. Horizontal lines are almost invisible when wearing glasses with vertical slits, and vice versa. You can have a lot of fun at parties with these.—S. Leonard Bastin.

Typewriter Cushions

TWO rubber balls cut in half will serve as a dandy set of cushions for elevating your typewriter on a table. When four machine legs are set down on inverted rubber cups, weight of machine will lodge supports firmly, preventing slipping or scratching table.—James Kelly.

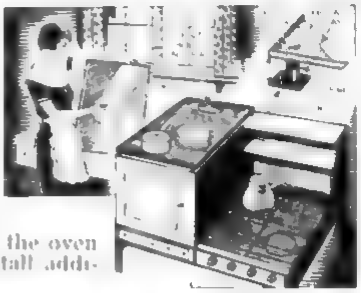
Painting Golf Balls Made Easy



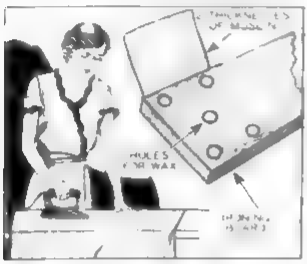
REPAINTING golf balls is really a simple job after you rig up this drying rack shown on the right. Make it from a shallow wooden box, or from three pieces of lumber. Drive small nails in the top of each upright and stretch wires or strings across. When painting, push bent pin in ball, dip ball in paint, then hang it on wire. Surplus paint will drip off leaving a smooth surface.—Harry Holland.

Stunts to Simplify Household Tasks

Warming Tray Fits Above Stove Oven



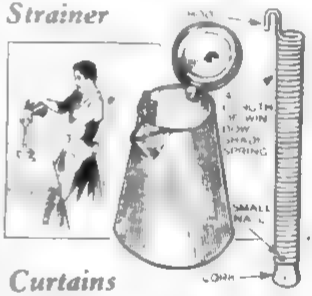
BUSY housewives are always on the look-out for labor-saving additions to their kitchen. This warming tray, which is easily removed for scrubbing at the sink, enables food dishes and chinaware to be kept warm after being taken from the oven. It is made of galvanized tin and shaped to fit top of oven. A hole in back of the tray fits over the oven vent allowing fumes unobstructed passage. Where stovepipe connects vent to chimney, slot in tray enables it to fit up against pipe. Tray rests on four 2-inch supports which are attached to the corners of the oven top or tray, as desired. If tray has too much sag, install additional supports.—Amos Dodds.



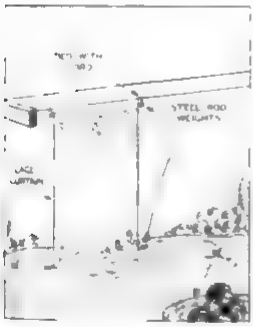
Ironing Board Equipped With Wax Polisher

MANY women have found that a small amount of wax is necessary on the ironing board for successful work. A self-waxing board is made by drilling five holes in one end of the board to one-half its thickness. Beeswax is poured in these and covered with two thicknesses of muslin. Cloth absorbs just enough wax when hot iron passes over holes to make iron work smooth. Wax supply can be easily replenished.—John Martin.

Tea Pot Uses No Strainer

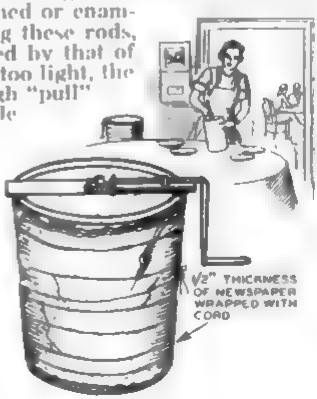


HERE is a way to make tea without having to strain it when pouring from the tea pot. Procure a length of window shade spring and bend a short hook into one end of it. Cut off the spring so that when a cork is forced into the lower end the bottom will just reach the base of the container. When preparing tea, pour the leaves in spring and hook it over side of pot, as shown. Water will penetrate easily, but leaves cannot escape the coil. When cleaning, spread spring and hold under faucet.—Thomas Moore.



Simple Way to Stretch Curtains

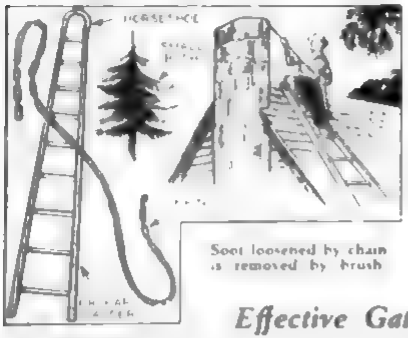
INSTEAD of going to all the trouble of stretching window curtains on a large frame so that they will keep their shape after being washed, why not stretch them as shown in the illustration on the left? A metal rod is placed through the top and bottom hems and the curtain hung on the clothesline by tying top rod to line, as shown. By adapting this method the curtains will dry in perfect rectangular form. If iron rods are used they should be varnished or enameled to prevent rust. In making these rods, their weight should be governed by that of the curtains, for if the rods are too light, the bottom one will not exert enough "pull" to keep curtain taut.—Dick Cole.



Insulating Cheap Freezers

MANY people who have inexpensive metal ice cream freezers find that the cream will not stay packed in them because the container is not insulated. The easiest and most satisfactory method of insulating the tub is to wrap it with folded newspapers to a thickness of one-half inch. Then wrap paper tightly with cord. When ice cream is made, the salt water will trickle out and gradually saturate the papers until they are welded into one hard pulpy mass which will keep the cold within the tub effectively. Ice cream will stay packed until the last has been removed.—Howard W. Sykes.

Kinks that Lessen Caretaker's Work

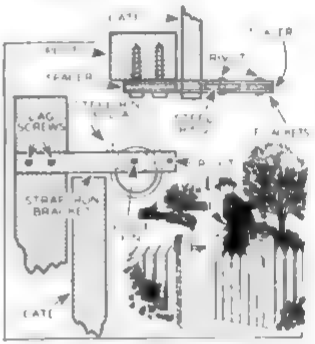


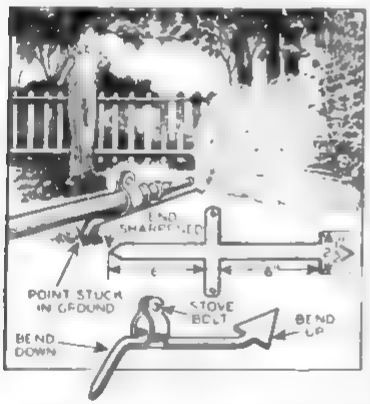
Chimney Cleaning Task Simplified

HERE is a system that will simplify the usually disagreeable job of cleaning the chimney and do a first class job of soot-removing. First swing a heavy chain around in the chimney to loosen up the caked dirt. Then fasten a small pine bush to the middle of a long rope. With someone at the base of the chimney to pull the bush down and you at the top to pull it back up, a few repetitions of this action will leave your chimney clean as a whistle. For the convenience of the man on the roof, ladder should be equipped with hooks on one end, so that it can be hooked over roof top, as shown. Jack Morrissey

Effective Gate Fastener

INEFFECTIVE gate latches are certainly a nuisance. The automatic fastener illustrated in the drawing on the right will do an A-1 job if made right. All that is needed to make the latch are two pieces of heavy strap iron, two lag screws, one steel ring, two rivets and washers or strap iron for spacers. Its dimensions will depend on the size of your gate and post. Ring is set in free on pivot pin so that, when slammed, the gate top hits the ring that hangs below the bracket, pushes it up, and after gate has swung past ring, drops down holding it securely. To open, merely push up the ring and the gate will swing either direction. Ordinary wind will not open the gate latch.—Major N. Howard.



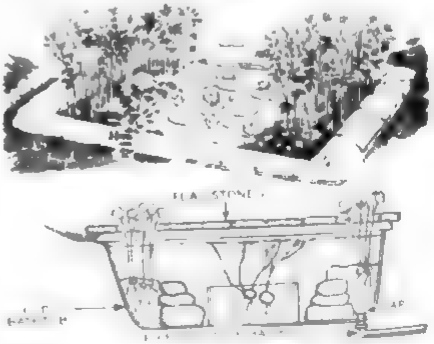


Easy Sprinkling With Nozzle Holder

THE trouble with most sprinkling gadgets is that it is hard to regulate their spray. What is more, they are inconvenient to handle when moving about the lawn. Here is a simple kink that permits effective sprinkling with the ordinary nozzle. This means that you can regulate and focus the spray wherever you want it; and the sprinkler can be picked up and moved with no need of turning the faucet off and on. Cut out a piece of strap iron the shape and dimensions shown in drawing on the left. Then drill holes in the small arms so that when bent in circular shape the nozzle can be inserted and held in place with a stove bolt. Bend sharpened end down and arrow head up so that water will spray when focused on it.—Everett F. Folger.

Flower Pond From Old Bath Tub

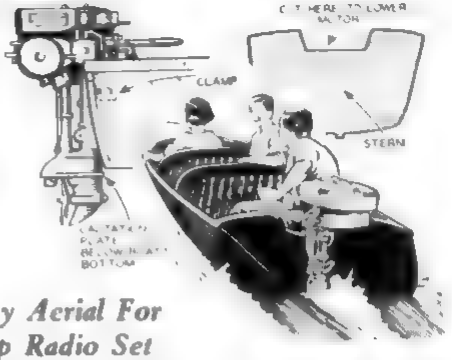
IF YOU'RE looking for something novel to "dress up" the grounds, there isn't anything quite so attractive as a small pond. You can use it as a flower pond, an outside goldfish basin, or both. The pond shown on the right is made by digging down an old bath tub and piping it to a house or lawn faucet. Flagstones set around the top will completely disguise the tub and give the pond an attractive outline. Rocks may be arranged to hold the sediment in which the flowers are planted and aquarium fixtures can likewise be added to give novelty to the "fish pond." Any type of stopper plug or cap may be used to prevent water from running out of tub drain into catch basins.—C. A. Thompson.



More Comforts for Vacationers

Adjusted Stern Aids Outboard Speed

AS THERE are many types of outboard hulls, it is apparent that the stern board onto which the motor is fastened is not the same height on all of them. To be correctly placed, the captivating plate of the outboard should be from 1" to 3" below the bottom of the boat. If your motor is not in this position, either place a block of wood on top of the stern or, if the motor is too high, cut away the stern, as shown, until proper height is reached.—James McDermott.

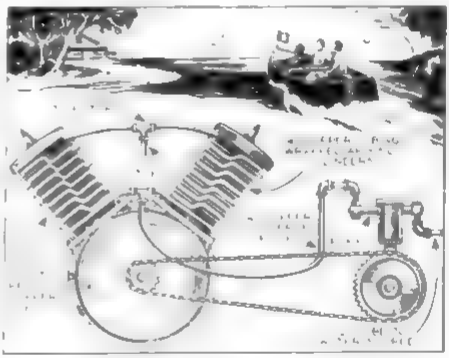


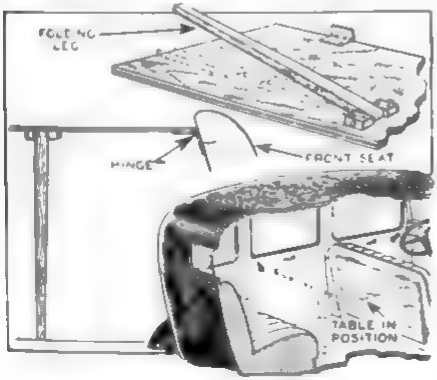
Handy Aerial For Camp Radio Set

MOVING out to the lake on your vacation? Or going for a long camping tour? Then you'll want to take your portable radio along. This simple little aerial takes but a few minutes to make and can be hung up almost anywhere. A small hole is drilled in both ends of two wooden coat hangers, and aerial wires fastened between them, as shown in illustration at left. Four insulators are needed and placed at each end of the wires, quite close to the hanger. Aerial is tapped, as shown, to form lead-in to the receiving set.—Hi Sibley.

Use Motorcycle Motor in Launch

YOUR old air-cooled motorcycle motor, or one acquired, can be fixed up without much expense into a dandy motor that will send your boat speeding over the waves. Cut notches in the cooling fins so that a piece of ¼-inch copper tubing can be wound around the cylinders as shown in diagram on the right. The return tube is attached where the tubes are connected across the top of the motor. The feed line is made of ½-inch tubing and the size of your motor will determine the size of the water pump needed to force the cool lake water through the tubes around the motor. Check the effectiveness of your pump on the trial spin. William Tatina

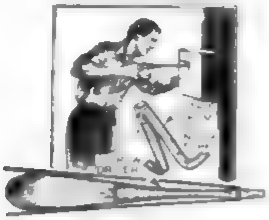




Folding Table For Camper's Car

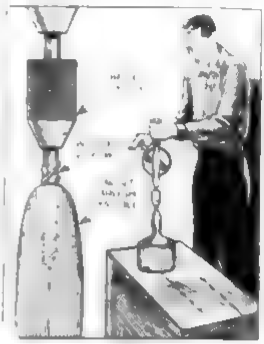
CAMPERS and tourists who travel by car can make a lot of use of this one-legged folding table that fastens up flat against the back of the front seat when not in use. Its size must be determined by the amount of space between the front and rear seats. Cut the top from ½" plyboard and fasten on a folding leg and two hinges as shown in the diagram on the left. Board is then attached to the back of the front seat so that top rests squarely when leg is dropped down. In camp, table can be taken out of car and fastened up against the wall of the cabin, or on a tree trunk. If table is to be used in a cabin, it may be desirable to make extra leg, a longer one, so that table will set up higher off floor.—James Gordon.

Labor Savers for the Repair Man



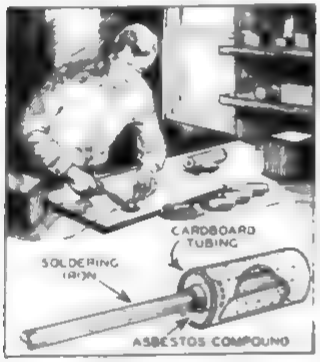
Safe Way to Repair "Live" Electrical Parts

WHEN replacing screws in "live" electrical equipment a simple way to get them in place without danger of receiving a shock is to use a strip of inner tube twice as long as the screw driver with a small slit cut in the center of it. Then shove the screw through slit and insert tool in groove. When screw is tightened in place, rubber can be pulled off. The rubber insulates screw driver and prevents shock.—N. C. Engen



Speedy Home-made Way to Clean Paint Brushes

IF YOU'RE going to do some painting up around the house this summer, you'll appreciate this quick means of cleaning paint brushes when changing from one color to another. The device shown on the right is made by inserting a wood screw into the chuck of a hand drill. Screw is turned into the end of brush handle until solid connection is formed. Then pour gasoline into an empty paint can and insert brush in it. Turning drill will revolve brush, cleaning it thoroughly. —M. G. Winterton

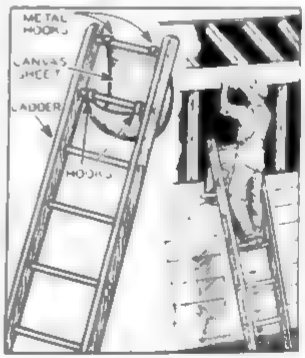


Electric Soldering Iron Heated Quickly

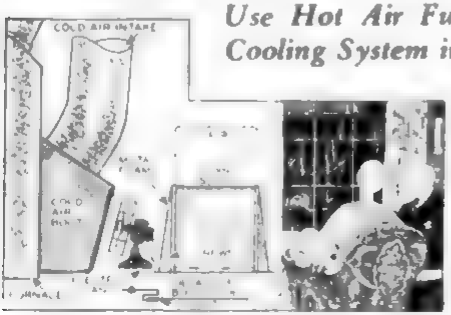
YOU can cut down the time needed to get your electric soldering iron to working heat by making one of these asbestos tubes shown on the left. A 5-inch section of cardboard tubing about 2 inches in diameter is filled with asbestos of putty-like consistency. Then the cold iron is pushed in so that it reaches to about ¾ inch from the end, and left until compound dries. Asbestos will shrink sufficiently to leave slight clearance for iron. Slip iron in the tube when heating, it will save time in getting it to working heat.—T. L. Parker.

Ladder Bag Holds Workman's Tools

GOING to do any building or repairing during your vacation? If so, you'll find this ladder bag a great help. Cut out a piece of canvas or heavy denim about two times the length of the space between the ladder rungs. Then rivet two metal hooks on the ends of the canvas, as shown in the diagram on the right, and hang the bag on the ladder. Extra length of canvas will form a pouch in which hammer, saw, nails and other equipment may be kept while working on ladder. This bag will save you many steps while you are building.—A. W. Waychoff.



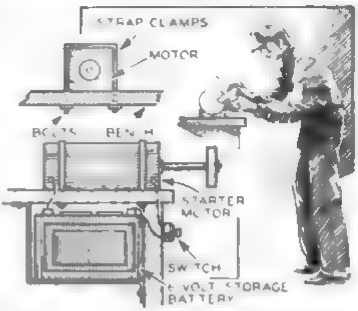
Use Hot Air Furnace For Cooling System in Summer



THOSE who have a fan system on their hot air furnace can rig up a dandy hot weather cooling system. Cut out the face of the cold air boot and build a metal slide door, as shown attached in accompanying illustration, turning the edges of the slide to fit into the metal groove fastened to the boot. Switching on electric fan set in front of the opened slide will send cool basement air up through registers. When cold weather comes dropping sliding door fastened to the boot to use.—J. L. Reeves.

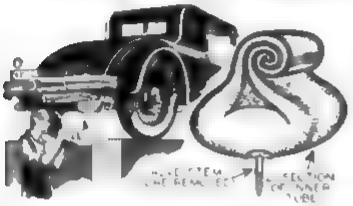
Interesting Items for Garagemen

Starter Motor Powers Shop Emery Wheel



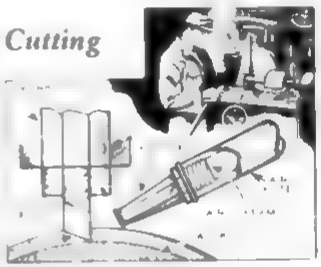
MOST every day the shop mechanic has to file down a bolt, smooth off a metal connection, or in other ways make use of an emery wheel. That is why this simple arrangement will make a handy addition to the shop. The motor is held down on the bench by using strap clamps. A 6-volt storage battery set on the bench shelf is wired to the motor as shown, with starter switch fastened on side of bench. Emery wheel attached to motor is held out free from the bench to facilitate using.—Russell Johns.

Grease Gun for Differential Greasing



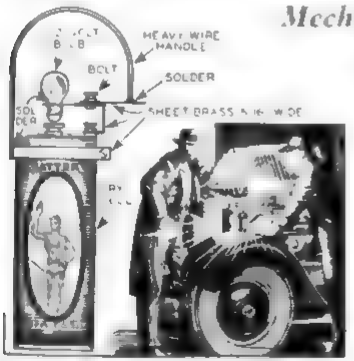
A MAKESHIFT grease gun for putting grease into the differential and transmission cases can be made by cutting a two-foot length from a discarded inner tube. Length should be cut so that valve stem is in the center. After vulcanizing one end closed, making section into a bag, take out the valve core. When grease is put in and ends folded up, as shown in diagram on left, pressure created by rolling up tube will force grease out of valve into case.—F. M. Mayfield.

Compressed Air Cooling Aids High Speed Cutting



HIGH speed cutting may be done faster and tools kept sharp for a longer period of time by equipping your shop with a low pressure compressed air tank. When working, nozzle on end of hose attached to tank is so adjusted as to blow continuously on the working tool at the cutting point. Besides keeping the working edge cool, the air from the nozzle blows away all the chips and dust, keeping the work clean. This is a real help when fine cutting is being done. Cooling system allows use of faster cutting speed and making deeper cuts.—Louis D. Ray.

Mechanic's Night Light Made From Dry Cell



INSUFFICIENT light often hampers garage men when working on cars stalled out on the road at night. Here is a lamp that will throw adequate light no matter what part of the car you are working on. Bolt a piece of 5/16" strap brass around a dry cell. Solder one end of the heavy wire handle to the battery band and the other to the brass piece onto which the bulb is soldered. Contact is adjusted by fastening a brass strip between outside battery post and bulb strip, as shown. When battery goes dead, the lighting attachment can be removed and fastened on another dry cell in a jiffy.

Robert Adams.

Handy Home-made Wrench Fits All Sized Nuts

HUNTING around for various sized wrenches takes a lot of time that can be saved by making a wrench like the one shown in the illustration on the right. It is made from a piece of square bar shaped as shown. Joint is either soldered or bolted for added strength. Rounded off end will serve as handle. The slanting shape of this wrench allows its use on various sized nuts without adjusting.—Edwin Kalieta.

Tunnel-DIGGING as a HOBBY

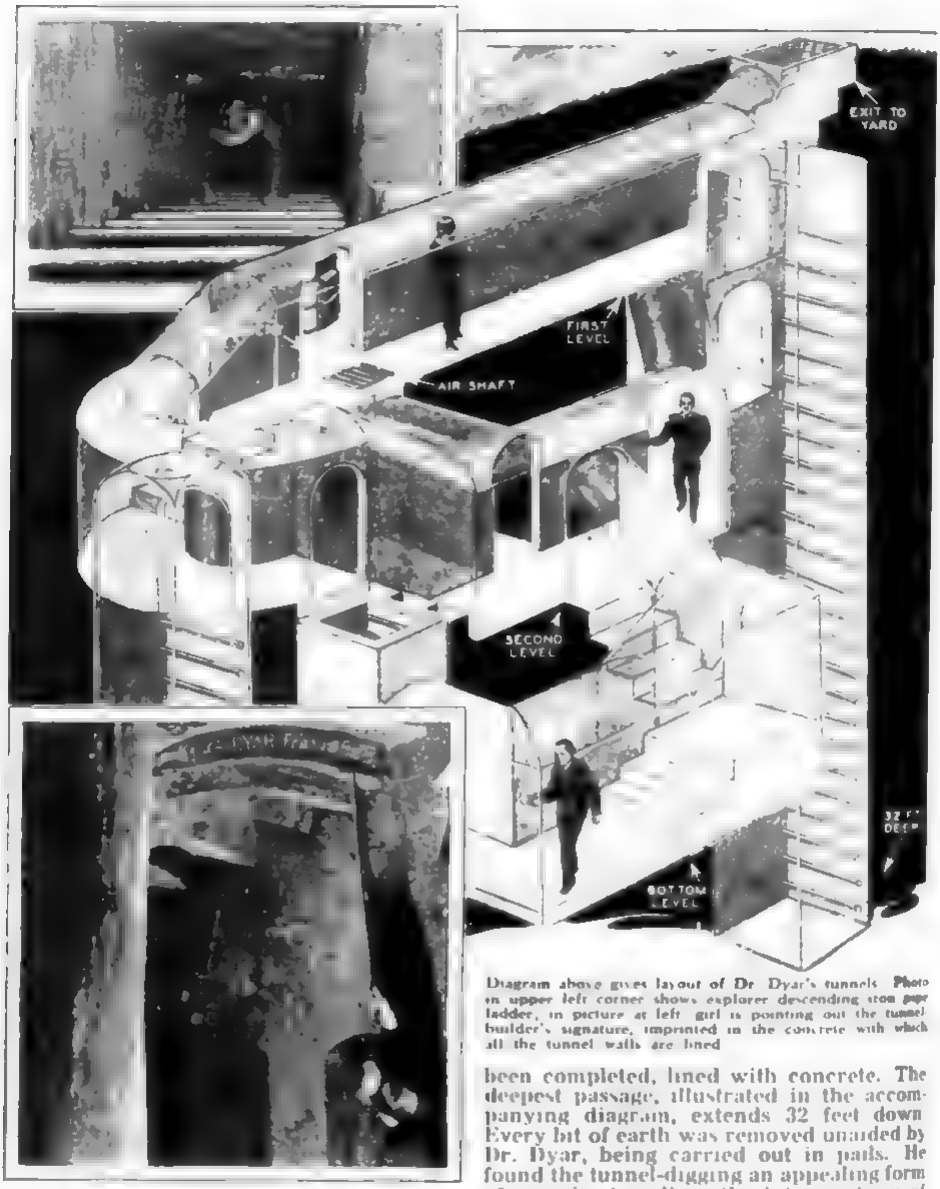


Diagram above gives layout of Dr. Dyar's tunnels. Photo in upper left corner shows explorer descending iron pipe ladder, in picture at left girl is pointing out the tunnel builder's signature, imprinted in the concrete with which all the tunnel walls are lined

ONE of the oddest hobbies in the world is that of Dr. H. G. Dyar, international authority on moths and butterflies of the Smithsonian Institution, who has found health and recreation in digging an amazing series of tunnels beneath his Washington home.

Almost a quarter of a mile of tunnels has been completed, lined with concrete. The deepest passage, illustrated in the accompanying diagram, extends 32 feet down. Every bit of earth was removed unaided by Dr. Dyar, being carried out in pails. He found the tunnel-digging an appealing form of exercise to relieve the intense strain of his work day, which involved much close work with high-power microscopes.

The catacombs are constructed in three levels, with steps and iron pipe ladders leading between different tiers. The idea first came to Dr. Dyar when he sought to make an underground entrance to his furnace cellar.

PLANE TALK

Edited by DOUGLAS ROLFE

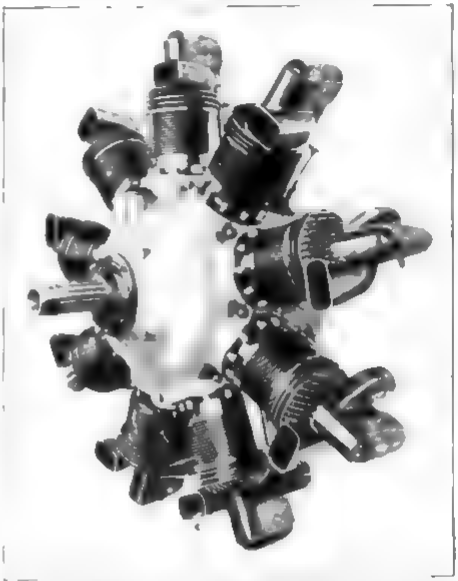
Diesel Featured by Economy, Free Wheeling

A PROMISING new Diesel aircraft engine embodying several unusual features new to engines of this type has been developed by the Guiberson Corporation of Dallas, Texas. Upon successfully passing the severe Department of Commerce tests, the engine was rated at 185 h.p. and awarded A.T.C. (Approved Type Certificate) No. 79.

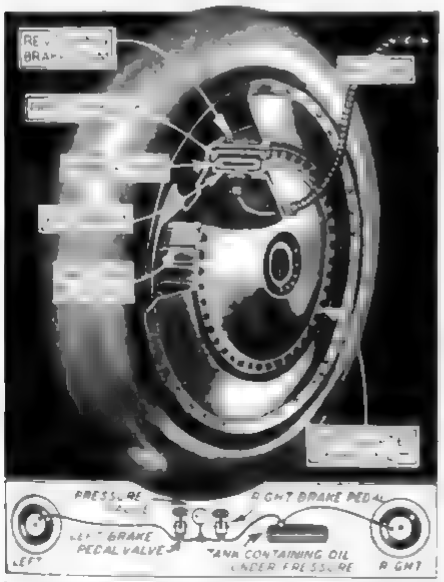
One extraordinary feature of this engine is the "free wheeling" arrangement whereby the compression may be released and the propeller allowed to turn freely. This is very important in event the pilot runs out of gas.

With this feature it is a simple matter to start the engine again by setting it at decompression, and operating the throttle.

Colonel Arthur C. Goebel, famous aviator and winner of the Dole race from San Francisco to Honolulu, flew a ship powered with the Guiberson Diesel from Dallas to Detroit, a distance of 1,120 miles at a total fuel cost of $5.72. Another airplane powered with a gasoline engine of the same horsepower made the trip, and the total fuel expenses were $30.95



Similar in appearance to a nine cylinder radial gas motor, this new Diesel has free wheeling feature which eliminates braking effect of plane's prop. Motor is rated at 185 h.p. and was awarded Approved Type Certificate Number 79



In new hydraulic brake system, oil under pressure is fed to rubber tube, expanding it and thus applying pressure to the friction block of revolving brake drum on wheel

Hydraulic Oil Brakes for Airplanes

THE need for flexibility, economy, and quick control are filled in a recent innovation in brakes for airplane wheels. Operating on hydraulic principles, employing oil instead of the customary water, the brakes offer instant control from the cockpit through the simple connecting medium of an oil lead.

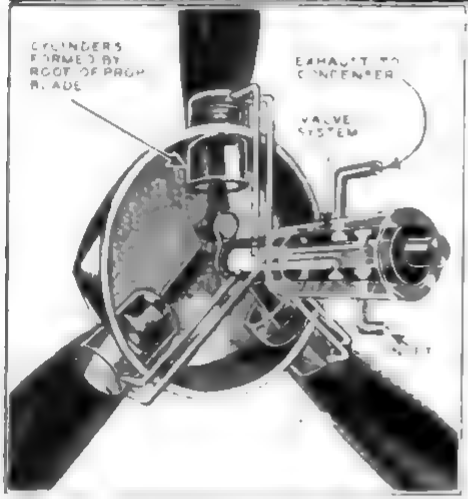
The operation of the system is illustrated in the drawing at the left. The chief element is a rubber tube resembling a simple inner tube which rests between the revolving brake drum of the wheel and the fixed brake drum of the hub.

Oil under pressure is fed to this rubber tube through a flexible pipe lead, passing through an opening in the fixed drum of the hub. When oil pressure is raised rubber tube expands and friction is applied through the friction block to revolving brake drum.

The oil under pressure is furnished from a special tank near the cockpit. The leads pass through pedal valves which are operated by the feet of the pilot.

STEAM Will POWER

Central boiler plant will furnish steam to many simple motors in the wing, will heat the cabin comfortably and prevent ice formation on wings in tomorrow's plane



The rotary motor is the only perfect power plant using reciprocating motion without reciprocating weight. Here's Hilburn's suggestion for the simplest "irreducible" power plant

The oldest prime mover—steam—is staging a comeback. Read what amazingly logical things can be accomplished with new designs in planes through the use of steam as a power plant and control medium.

by **EARL D. HILBURN**
Aeronautical Engineer

EVERY once in a while we have to "get back to nature"—get back to the simple things our dads used. Often we find that we've been on an engineering merry-go-round and that the old gentlemen who were our forbears had some right good ideas in design, but were unable to use them to the fullest extent of their theories because the right materials were not available in iron, or steel, or something else.

And every so often the subject of what tomorrow's airplane will look like bobs up in some writer's mind. He is usually hard pressed to get something really new to write about, so he lays it on thick and the resulting pipe dream generally makes an air-minded man who has any air "savvy" pretty sick.

Recent developments in engineering activities have brought these two phenomena together again: steam and tomorrow's airplane. Strangely, some real progress has been made, and we find that steam, used by our grand-dads as an old reliable medium, has been put into new clothes by the developments in materials to the point where it can be considered within reach on all engineering points to make an ideal power plant for a new airplane which will bristle with logical departures.

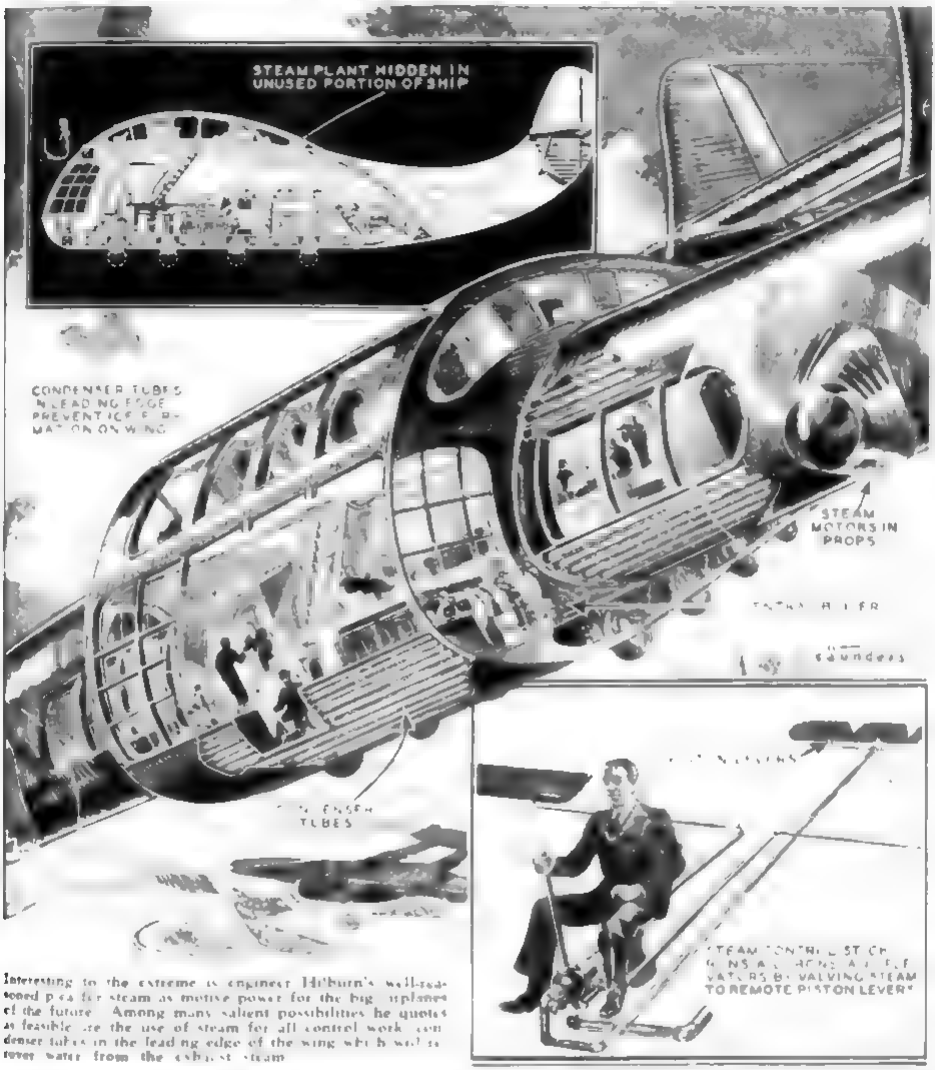
Let us take a fundamental consideration: The power plant of the future Leviathan of the air by necessity must be more powerful than is at present practical to build with the present day highly complicated internal combustion engine. The limit is approached in gas engines when such ships as the Dornier DO-X must use twelve 600 h.p. engines separately mounted with all the mess of gauges, magnetos and so forth that must be duplicated time after time.

Airplane designers are far ahead of engine designers in aircraft developments and many of the leading minds of the engineering world are striving to develop engines of suitable design for tomorrow's airplane needs.

Among them is Capt. Richardson, of the Great Lakes Aircraft Corporation, for whom the aeronautical world has profound respect. Also, working along different lines in this search which points toward steam as tomorrow's motive power is Abner Doble, one of the world's leading authorities on steam.

Whether or not the ultimate power plant will be of the turbine type such as Richardson is developing, or whether the engine will be of the reciprocating expansion type

Tomorrow's PLANES!



Interesting to the extreme is engineer Holburn's well-reasoned plea for steam as motive power for the big airplanes of the future. Among many salient possibilities he quotes as feasible are the use of steam for all control work, condenser tubes in the leading edge of the wing which would recover water from the exhaust steam

as is being developed by Doble remains to be determined.

Another consideration at once becomes obvious when we consider the possibilities of the steam power plant.

These are the advantages which may be derived from the steam in the operation of controls, combination shock absorbers and retracting devices for landing gear, single throttle for all engines, heating of leading edge and propeller to prevent the formation of ice, heating of cabins, cooking of meals, generation of electricity for lighting and for radio equipment.

The controls may be operated with the conventional control stick connected to two rotary valves sitting at right angles. The fotward movement of the stick rotates the valve which is connected by steam line with the cylinders operating the elevators. The side movement of the stick, in like

(Continued on page 172)

GRAVITY *Controls Stabilizing* DEVICE

The Roberts Automatic Stabilizer is installed in the fuselage of plane in position illustrated above. Fore and aft rod on which control column is mounted is replaced with rod having loop, in which is suspended the pendulum cylinder holding 18 lbs. of mercury. Note connection of wires leading to elevators, rudders and ailerons

Drawing shows how stabilizer maintains plane in level flight. Pendulum action is conveyed to control elements by wires

THE ability to fly for long periods without attention to the controls is highly desirable in aerial navigation. Such freedom permits the pilot to relax his attention from the controls so that he can concentrate on navigation, or merely rest.

The Roberts automatic stabilizer, recently developed, has come to the relief of the harassed pilot, freeing him from necessity of constantly attending the controls. Extremely simple in operation, the device employs the pendulum principle to permit "hands-off" flying for indefinite periods.

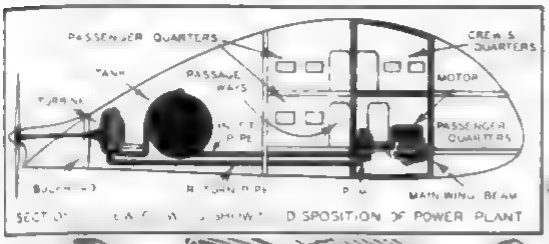
Operation of the stabilizer is illustrated in the accompanying drawings. The fore and aft rod on which the control column is mounted is replaced by one having a loop in the middle. Suspended within this loop is a cylinder which rocks laterally with the control column, and is also free to rock fore and aft.

The latter motion is communicated to the control column by an adjustable link. Within the cylinder a second and smaller cylinder is provided containing 18 pounds of mercury. When the device is in action the weight lies at the bottom of the suspended cylinder and thus provides the pendulum action which is in turn communicated through the regular control system to the control surfaces.

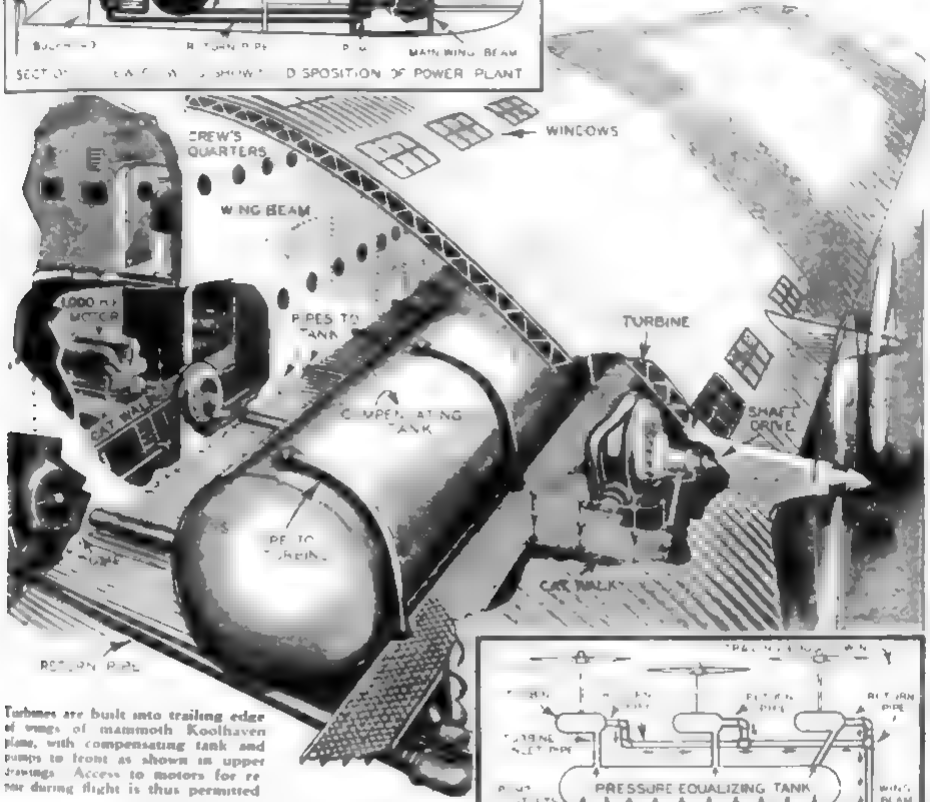
If the pilot wishes to disengage the device a control is provided whereby the inner cylinder containing the weight may be raised to the pivotal point, thereby throwing it completely out of action.

Turbines Power Mammoth Flying Boat

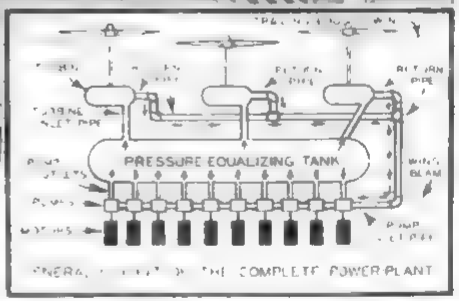
Koolhaven plane, twice size of DO-X, employs three powerful turbines driven by ten motors on novel hydraulic principle.



SECTION SHOWING DISPOSITION OF POWER PLANT



Turbines are built into trailing edge of wings of mammoth Koolhaven plane, with compensating tank and pumps to front as shown in upper drawings. Access to motors for repair during flight is thus permitted



Turbines are driven by water under pressure from equalizing tank as shown. Pumps draw off exhaust water and compress liquid in tank. Three throttles govern turbine speed

THE mammoth Koolhaven flying boat, now under construction in Holland, which will dwarf the German DO-X, being twice the size, is to have a power plant which has evoked amazement from aeronautical engineers throughout the world.

Instead of having twelve motors built above the wing, as in the case of the DO-X, the Koolhaven boat has ten motors built inside the wing each driving a pump connected to a pressure equalizing tank, as illustrated in the accompanying drawings.

From this tank the water under pressure is delivered to three turbines built into the trailing edge of the flying wing of the giant plane. It is these three turbines which turn the extra large propellers to drive the plane through the air.

Water passes in a continuous cycle through the apparatus. The exhaust liquid is drawn back by these aforementioned pumps and then delivered to the compensating tank, where it is kept constantly at sufficient pressure for the required power. Such an arrangement permits easy access to the motors for repairs during flight.

The Koolhaven boat has a wing spread as wide as a football field is long, has a carrying capacity of 42 tons, and weighs approximately 100 tons. The three turbines, which will drive the boat 140 miles per hour, are always under easy control of the pilot, who governs their speed with three throttles.

Synchronizing Photo Flash Lamp With a Camera Shutter

When wired up as shown in the insert the photo flash lamp is set off at the precise instant the shutter is clicked. Silver contacts to the battery and flash lamp close the circuit

THE difficulty of synchronizing the flare of a photo flash lamp with the click of the shutter is frequently encountered by enthusiasts of the camera art. There's a way to overcome this difficulty, however, and that is by constructing the little gadget shown in the accompanying photo.

The contrivance consists of a flat type pocket flashlight battery mounted between two pieces of wood, on the top of which is affixed a common porcelain socket to hold the photo flash lamp.

On the base of this baseboard is mounted a pair of contacts in such a position that the loading lever will push them together when the shutter clicks. The wiring is illustrated in the insert.

Synchronization is achieved by the simultaneous clicking of the shutter and the closing of the photo flashlamp circuit through the silver contacts. The duration of the flash is 1/50 of a second, which occurs when the shutter is wide open.

For convenience, the flash lamp unit is secured to the head by an elastic band, thus leaving the hands free to operate the camera. The lamp should be backed by an aluminum reflector.

Select Record Over the Phone

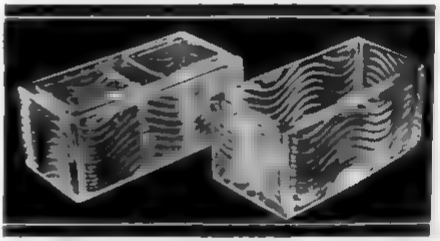
MUSIC dealers will have to go a long way to exceed the enterprise of a Coventry, England, tune merchant, who has worked up a stunt to sell his patrons phonograph records over the phone.

His scheme works like this. First he circularizes all the local telephone subscribers who possess phonographs. Then when they want to pick out one of the latest hits for purchase they simply call up the clerk at the store who proceeds to play a selection of records over the phone. The customer then makes his choice.

For transmission over the phone a large horn is affixed to the mouthpiece which listens to the music. A special amplifier clarifies and increases volume for reproduction.

Selection of latest phonograph records is played over the phone to customers in enterprising stunt of English music dealer. Record chosen is then quickly delivered C O D

Glass Houses of Future Won't Burn



Made of glass and laid up in masonry with ordinary mortar these new bricks admit full quota of light and prove high resistant to fire. Ideal for interior and exterior panels

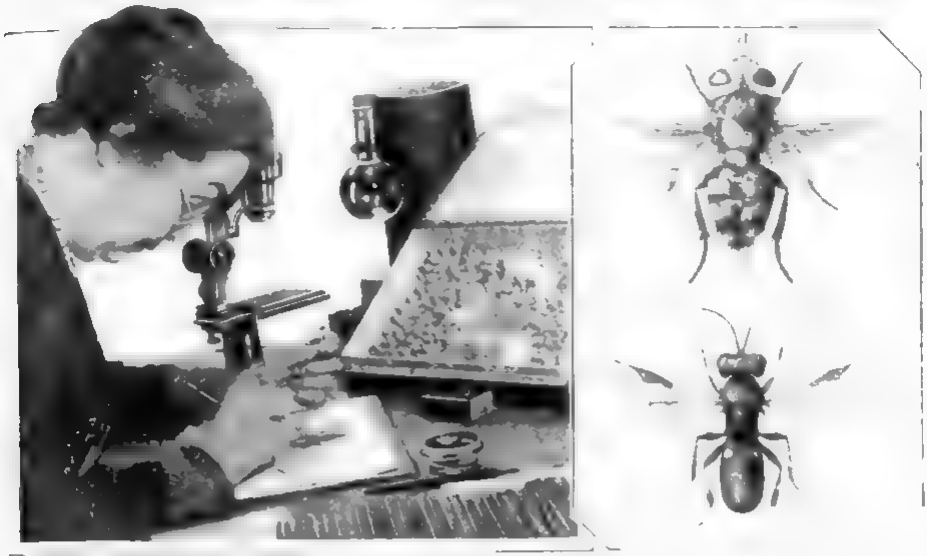
NO WINDOWS for lighting will be necessary if a new translucent building brick just developed for the market comes into general use. Made of heat-resisting glass these new bricks have been raised to temperatures equivalent to those encountered in burning buildings without the slightest damage save a slight cracking of the surface when cold water was played on them.

The glass bricks are laid up in masonry with ordinary cement mortar and are expected to prove ideal for pent houses, and interior and exterior panels.

Rays Make Explosives Useless

WARS of the future may be brought to speedy conclusion if an "anti-war ray" recently developed by a young German inventor proves practicable. The rays are generated by a special radio transmitter which projects a beam that renders the enemy's ammunition useless

"Bug-Drawing" is Difficult Form of Art



Miss Esther Hart, government "bug artist," is shown above with the equipment she uses in drawing insects. Powerful microscopes are used. She is holding an insect on a pin; at the right is the finished drawing, many times enlarged.

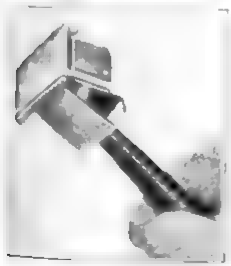
WHEN you open the pages of a magazine and an enormous bug makes you almost jump out of your skin, drawn to ferocious scale, you little realize, doubtless, that here is represented the most delicate and accurate drawing in the world. To reproduce insects perfectly they must be drawn under high-powered microscopes, be otherwise enlarged and be chloroformed!

Perhaps no artist has drawn more bugs of the different types than Miss Esther H. Hart, Government "bug artist."

"I first start by taking the measurement of the size of the bug I am to draw," says Miss Hart, "through a micrometer scale on my microscope. Then I take the different parts and study their proportion to the general whole.

Some bugs collapse. These are more difficult to draw. They have to be kept alive, so I chloroform them; just enough ether to last them 10 or 15 minutes. The Hessian fly is one of the collapsing bugs. Some of the bugs go to pieces. This makes it necessary to keep them in water or liquid. Such is the sunflower moth. Veins in the wings must be carefully drawn to distinguish species."

A color expert lifts a finished drawing of a formidable creature which is nothing more dangerous than a potato bug.



This razor runs by electricity.

Electric Safety Razor Is Latest Boon for Shavers

NOW even the safety razor is powered by electricity! The photo at the left shows the latest type of razor which uses a tiny electric motor for power, and is said to slice through the toughest beard with surprising ease.

The motor is mounted underneath the blade and imparts a vibratory motion to it. The mechanism is extremely compact and adds but little to the weight of the razor. Wires run through the handle to the motor, and by simply plugging into the nearest electric socket, the mechanism is ready for use.

Ordinary blades of a popular standard make are used, so that except for the power attachment the razor is little different from the one shavers have long been accustomed to. Current consumed by the small motor is negligible.

Build This OLYMPIC

Plans for the Official Olympic Games

Modern Mechanics and Inventions again scoops the mechanical magazine field by publishing here for the first time the official plans for the Olympic "one-design" class. She comes from the board of the most famous of West Coast designers, Mr. Edson B. Shock, known to every yachtsman. Truly, this boat has a pedigree you can be proud of.

by STEPHENS MIRANDA and ADEN HILL

THE Olympic Monotype, which might be called a centerboard catboat with "V" bottom, is unsurpassed for light to medium weather sailing. The low cost of construction and the fact that it requires a minimum use of the steambox and no elaborate tools, make it an ideal craft for home building, while the comparative safety with which it can be handled makes it ideally suited to the requirements of the younger generation of yachtsmen. Furthermore, the fact that this design has been officially adopted indicates the prestige which it enjoys among those who build and sail *good* boats. Building costs should come between $30 to $150 depending on location.

It is modestly hoped that this article will inspire the construction of this type of craft in and around yachting centers to the extent that Monotype clubs might be organized, thus promoting the sport from the competitive angle and making the boats of proportionately greater value.

The very first step in the construction of the Olympic Monotype, even before any wood is cut, is to lay out full-size drawings of the hull lines and half top view. Several yards of heavy wrapping paper will serve nicely for this. It is necessary that the contour (curvature) of the stem, keel, chines and deck be laid out exactly as indicated for any dimensions not indicated on the working drawings must be obtained by actual measurement on the full-size drawings.

The next step is to lay out, also on heavy wrapping paper, full size drawings of the six frame details (the frame mounted at an angle just forward of the mast is not laid out until later). Fig. 1b shows how easily this can be done by avoiding the tedious measuring of angles. First the L. W. L. (load water level) line and vertical center line are laid out, then the deck, chine and keel lines are located as shown. The dimensions shown in Fig. 1a are those of Station 3.

BLUE PRINTS OF THE MONOTYPE BOAT CAN BE HAD FOR ONLY $3.00

This little boat can be built for a sum ranging between $30 and $150 according to the locality in which she is built. If you want a fine little boat—one that will prove easy to build and which will sail safely on all points of sailing, you cannot beat this little fellow. The blue prints are large and clear and greatly simplify the job of building. Address Modern Mechanics and Inventions Magazine, 529 So. 7th Street, Minneapolis, Minnesota. Your prints will be sent quickly, postpaid.

Monotype Sailboat

V-Bottom Centerboard Catboat

As designed by Naval Architect E.B.Schock

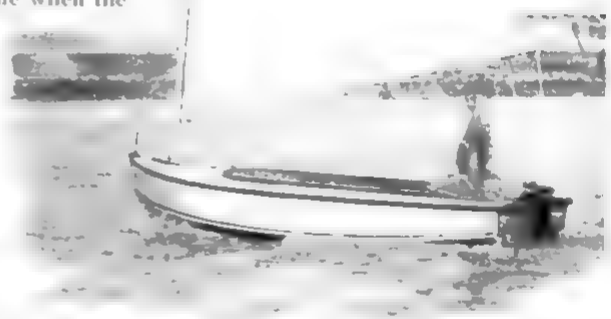
As the dimensions of the two frames between Stations 1 and 2 are not given on the working drawings, they are obtained as follows: Measure along the L. W. L. line on the hull detail to obtain the position of these frames, keeping in mind that on the working drawings one-eighth of an inch equals one inch. Then locate the position of these frames on the full-size hull lines and half top view by straight lines, as the architect has done in the case of each station. By measuring along the lines just drawn, the necessary dimensions for the two frames between Stations 1 and 2 can be obtained. Too much importance cannot be directed toward the necessity for accuracy in laying out the full-size drawings. Fig. 1a shows the frame cut to take the chines, although this is not done when the frames are first assembled; however, the part to be cut away must be kept in mind when fastening the parts of the frame together. Fig. 1b shows the floor board support. Top ends of the frames should be left about 2" longer than the actual dimensions, to be trimmed later. Station 5 is the transom.

In assembling, the side pieces of the frames and the floor supports are laid in place on the full-size drawing, then the bottom pieces of the frames are laid on top of these, and all are fastened together with 2½" copper clinch nails. The nails are cut off and burred over where they come through the wood, which is equivalent to riveting.

Cutting the Keel

Next comes the shaping of the keel, which is for the present left a few inches longer at the stern end than its actual dimensions. A slot 1"x4½" must also be cut in the keel, its position being determined by referring to the hull detail.

The stem is cut from a single piece of wood, preferably oak, although in localities where Philippine mahogany is cheaper the latter may be used. The contour of the leading edge of the stem is given on the hull lines, the varying thickness of the stem and the position of the rabbet appear to scale in the hull detail. Fig. 1l gives another view. Although not so shown in the hull detail, it is suggested that the recess to take the foot of the mast be made 1"x4½". This extra length permits the use of wedges for shifting the foot of the mast either forward or aft, which is an advantage. Number 12, 2" brass screws hold the keel and



The Monotype class boats are especially at home in light to moderate winds, where they will foot along at a surprising rate. Note speed in light breeze.

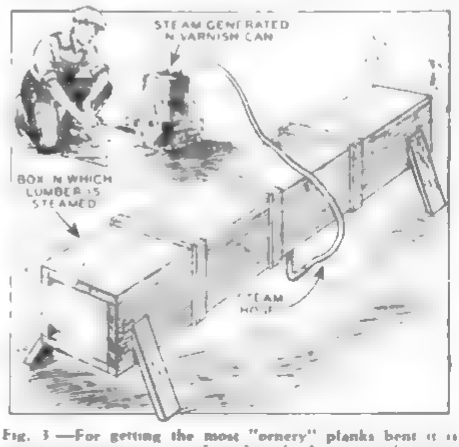
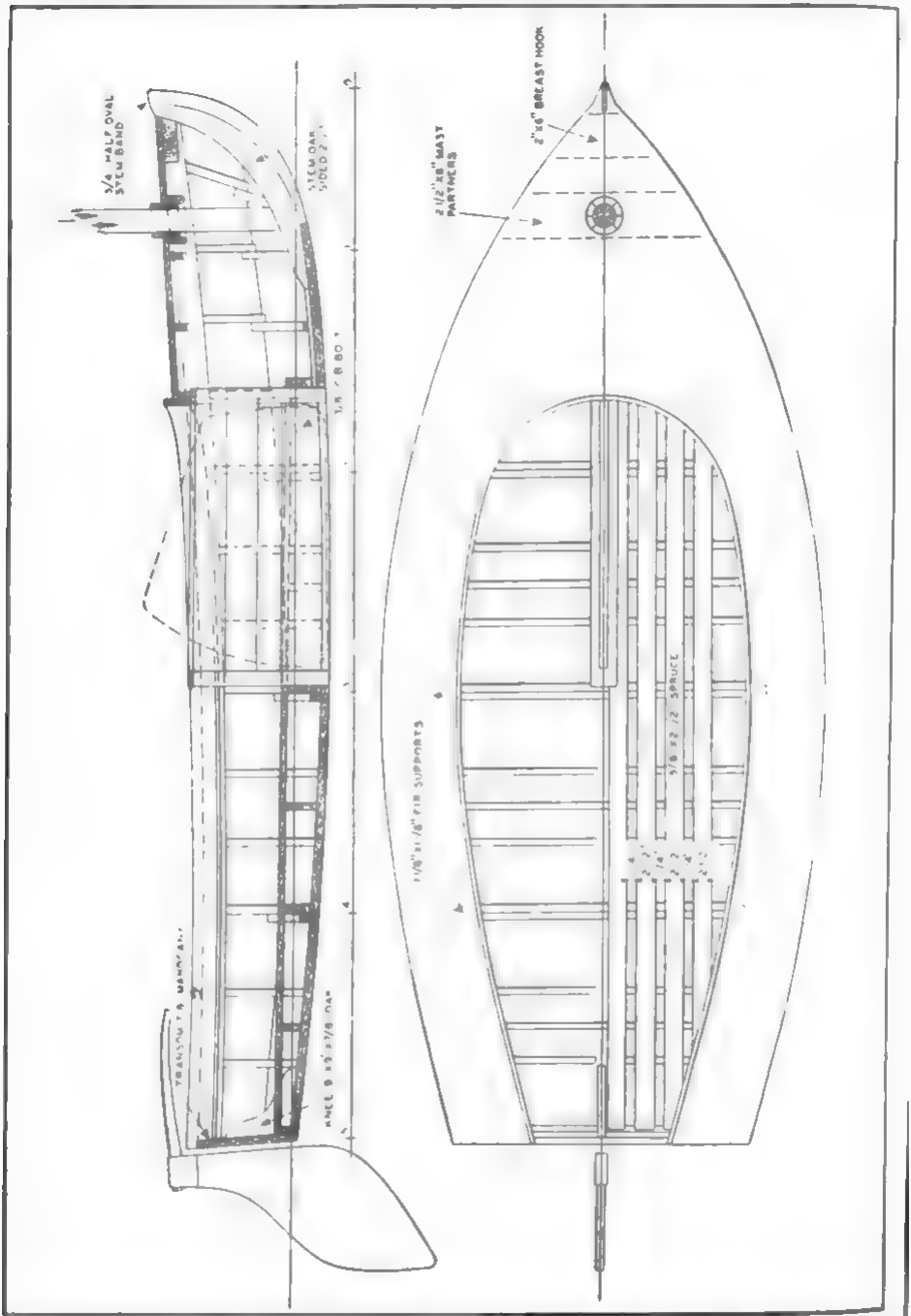


Fig. 3.—For getting the most "ornery" planks bent it is sometimes necessary to soften them by heating with steam. The drawing above shows a typical plank steam box.



The symmetry and sturdiness of the Monotype Class is clearly shown in these drawings, which are the originals as penned by Mr. Schock, and on which Modern Mechanics and Inventions own style of lettering has been superimposed. Major dimensions for floors and frames are clearly given. Follow the plans closely—don't try to change them.

Strongback Holds Units of Boat in Proper Places During Framing

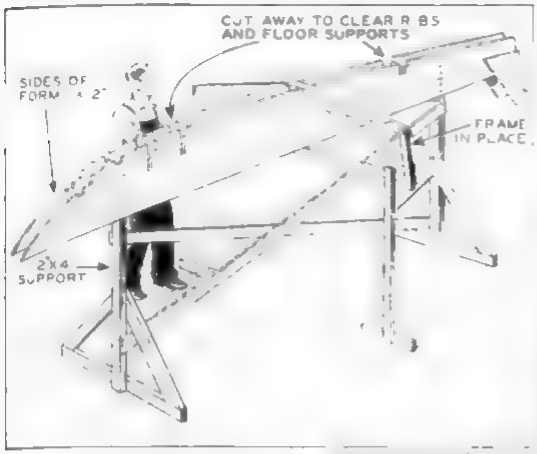
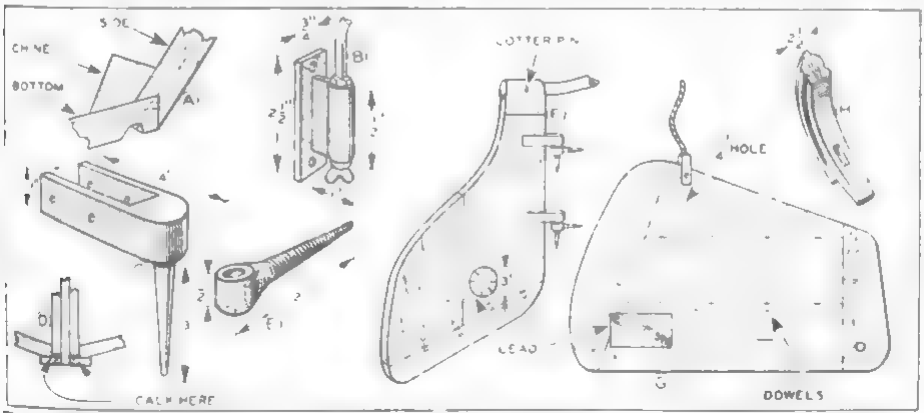


Fig. 1b. This drawing shows how the cross frames are held by a strongback during framing.

The disposition of the halliard and mainsheet is shown here. The boat is a pole-masted cat without stays, and is the last word in adequate simplicity.

stem together, being passed through the keel and into the stem. A ⅜" half oval metal strip is fastened to the leading edge of the stem.

The centerboard trunk measures 17" from keel to under side of mahogany top piece, and is 41" long. The end pieces, which are 1"x2", extend seven-eighths of an inch below the edge of the trunk so as to fit into the ends of the slot in the keel. The sides of the trunk rest on the keel, and Number 12, 2½" brass screws pass through the keel and into the sides of the trunk. Fig. 2 gives an end detail of the centerboard trunk, and shows how the frames just forward of, and at Station 2 meet the trunk. The bottom edges of the sides of the centerboard trunk must be shaped so as to conform to the contour of the keel, which contour is determined from the full-size hull lines. Obviously, the inside of the trunk should be painted before putting together. It receives the same treatment as the bottom of the hull. When repainting becomes necessary, a cloth wound around and bound to a slender stick serves nicely. The mahogany strip around the top of the trunk should be protected by a strip



The manner of pouring lead weights into rudder and center board is hereby illustrated. See alphabetical detail in text

Here the Monotype is heeled down by her crew and is ghosting along in a light air.

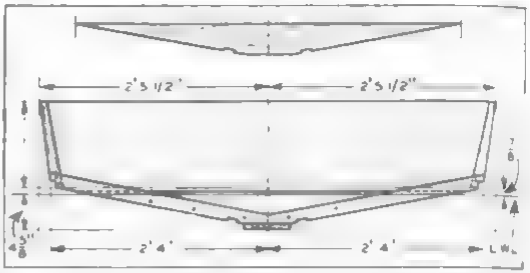


Fig. 1a. This shows the method of framing as at Station 3. Above is shown a floor as described in accompanying text

Approximately 85 square feet in area, this sail plan of the 12-foot length of the Monotype gives a very lively little boat, keen on all points of sailing.

of brass on each side of the slot at the point where the ¼" pin engages the centerboard to hold it out of the water. Calk with white lead and lamp wicking where sides of the trunk join keel.

Making the Form

Before anything further can be done on the boat itself, a form must be made, an outline of which appears in Fig. 1b. The contour of the form is the same as that of the keel, and is determined from the full-sized hull lines. Care must be taken that both sides of the form (the one-by-twelve's) are identical. The stern end of the form and the transom support must be cut at the proper angle to accommodate the transom, said angle being determined from the full-size hull lines. Fig. 1b shows the form cut away to accommodate the frames; however, there will have to be additional recesses cut into the form to accommodate the floor supports not a part of frames, and which are shown in the hull detail. Fig. 1b includes a bow view of the form. The builder cannot be too careful in the construction of this form. The recesses for the frames and floor supports must be in exactly the right place, and must be cut so that a good fit results.

Shaping the Transom

After the form is finished, the next step is to place the frames and floor supports in their respective recesses, after which the stem-keel-trunk assembly is inverted and clamped in place on the form. The stem is made fast by a long screw passing upward through one side of the form and into the stem. The frames must be rigidly braced, otherwise their shape will be distorted when the sides are bent on. Fig. 1b shows an effective method of bracing, the shaded portion representing the frame and keel. This bracing is, of course, only temporary, and is not to be fastened permanently to parts of the boat proper. After the bracing and clamping is finished, Number 10, 2½" brass screws are passed through the keel and into the frames and floor supports.

The transom is cut from one piece of wood according to the dimensions of Station 5. After it has been put in place on the form, Number 10, 2½" brass screws are passed through the keel and into the transom. The extra portion of the keel is then trimmed away flush with the surface of the transom. Care must be exercised that the knee makes a good fit against both keel

and transom, as it is subjected to more or less strain, and must receive the rudder mountings.

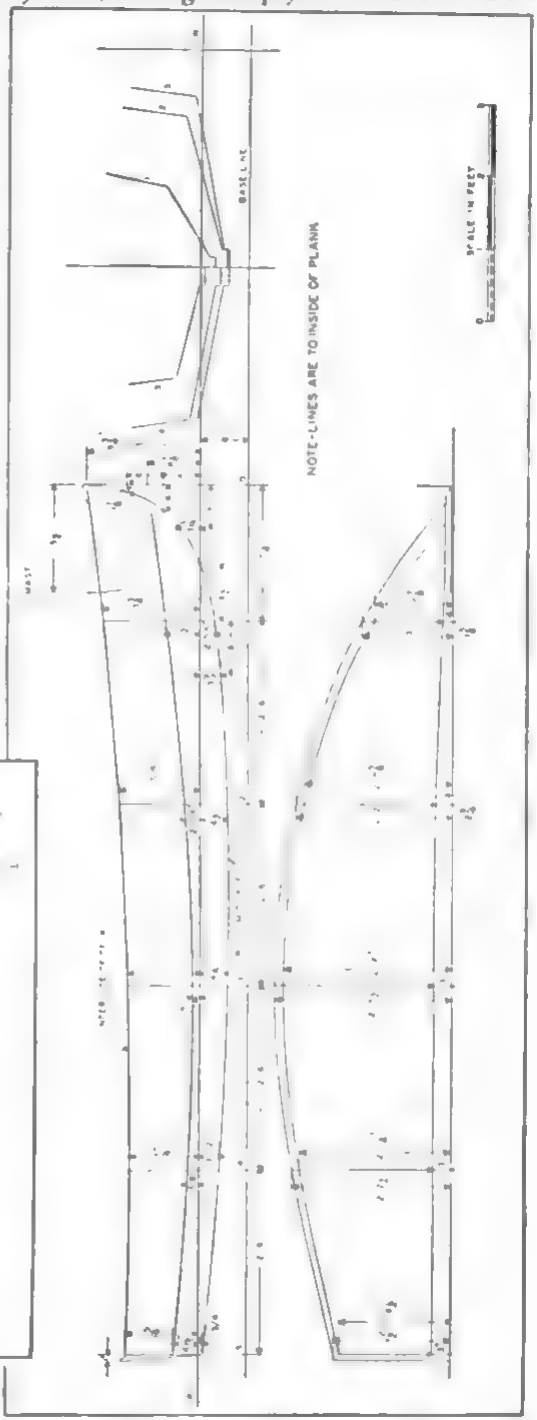
It would be well for the builder to make a careful survey of his work at this point, to make sure that stem, keel, frames, and transom are correctly mounted, and firmly braced and clamped in place.

The frames and transom should now be cut out to receive the chines, which are $\frac{5}{8}$" by $1\frac{1}{2}$" strips running the length of the boat, being held in place by brass screws. After the chines are in place, they are beveled to conform to the shape of the frames at the corners.

Measurements for the frame just forward of the mast, and which is set at an angle, can now be taken, and the frame made and put in place. This frame meets and is screwed to the stem, but not the keel.

The sides are put on next. Each is one piece, and is cut according to the full-size hull lines, except that it is for the present left about an inch wider and a foot longer than the dimensions indicate. It is necessary to steam the sides for only about half their length from the forward end. After about an hour and a half in the steam box they are bent in place, starting at the bow. The process of fitting the sides into the stem may

(Continued on page 162)



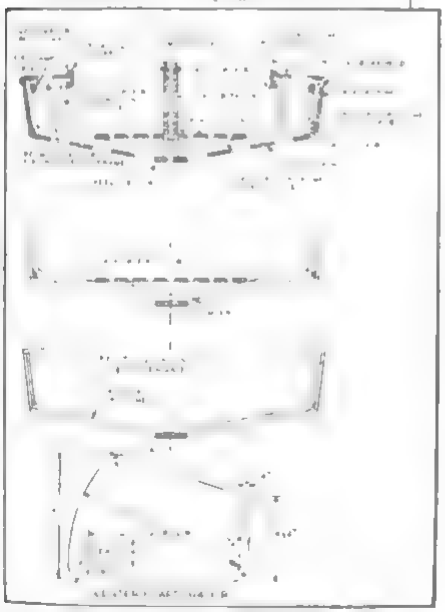


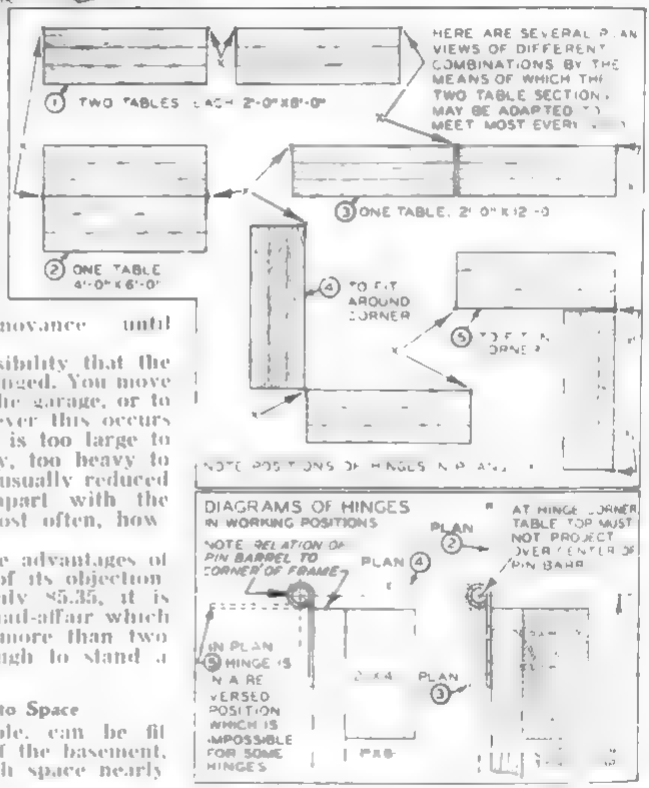
Fig. 2. To the right are shown lines for laying down the tailboat. Above are shown the sections which give a clear idea of materials used.

A Knockdown Workbench

If the bench space you have is long and narrow, or if you prefer a long bench, swing one of the tables around, as shown in the drawing above, and you have a working space twelve feet long and nearly twenty-four inches wide

BILL OF MATERIALS

3—2"x8"x5' 0", for the top
4—2"x4"x2' 8", for outside legs
2—2"x6"x2' 8", for inside legs
2—1"x8"x1' 0", for top rails
1—1"x6"x1' 0", for bottom rails
6—1"x6"x6' 0", for shelf and shelf back
1—1"x4"x6' 0", for front shelf edge
1—1"x6"x6' 0", (or 12' 0") for partitions
6—2" loose pin hinges
24—1½ or 1¾" screws
Some 8 and 10 penny nails.



The secret of this work bench lies in the placing of the hinges. To assure proper positions, study the above diagrams carefully before fastening hinges on your bench

THE ideal bench for the basement shop is, of course, one that is large and substantially built. Its broad area permits the arranging of tools and machinery. The larger the bench, the less vibration and the less annoyance until moving time.

There is always a possibility that the present layout may be changed. You move it from the basement to the garage, or to another basement. Whenever this occurs the big bench suffers. It is too large to pass through the doorway, too heavy to handle readily, and so is usually reduced to kindling or taken apart with the thought of rebuilding. Most often, however, it is left behind.

Here is one with all the advantages of the big bench and none of its objectionable features. Costing only $5.35, it is no more than a saw-and-nail affair which can be made in a little more than two hours, but is steady enough to stand a lot of rough usage.

Bench Is Adjustable to Space

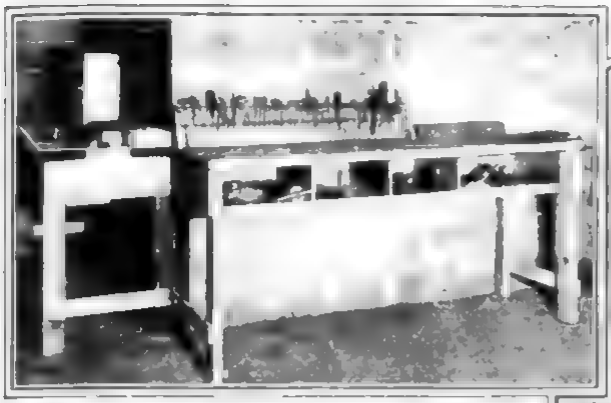
This bench is adjustable, can be fit around a jutting corner of the basement, and gives 12 feet of bench space nearly 24 inches wide.

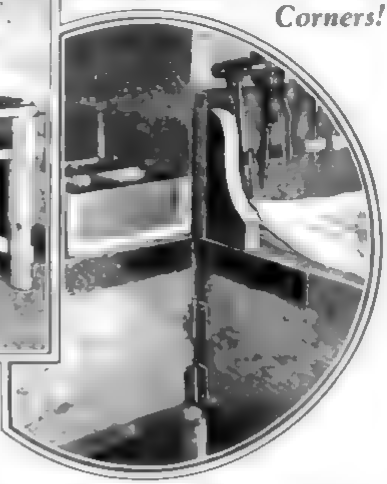
Assembled one way, it is a sturdy affair 6 feet wide and 6 feet long. By simply pulling three hinge pins it opens to a bench 2 feet wide and 12 feet long that can be set straight or around a corner. By pulling more hinge pins you have two separate benches, 2 by 6 feet each, that can be easily moved through the doorway when moving.

The assembly is simple. Square and cut each piece called for in the list of materials. Cut the outside corner legs first and lay them upon the floor. Then cut the top and bottom rails, which are ripped from the 1 x 6-inch piece. See that these are exactly the same length to assure a square-setting bench.

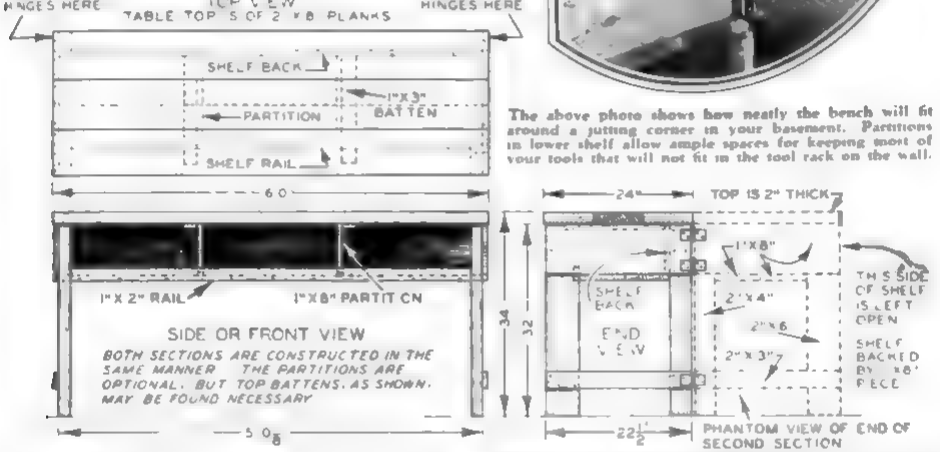
Now lay the two of these ends together with the 2 x 3-inch pieces and connect

Designed to Fit Around Corners!





The above photo shows how neatly the bench will fit around a jutting corner in your basement. Partitions in lower shelf allow ample spaces for keeping most of your tools that will not fit in the tool rack on the wall.



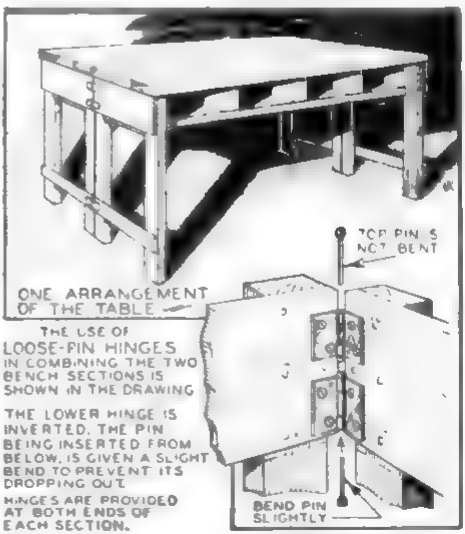
When using shelves, it is best to nail a narrow strip along the front of the shelf bottom, as shown above. This will prevent the tools from falling out on the floor

them with three hinges, as shown. Then pull the pin from the lower hinge and bend it slightly so that it won't drop out. Replace it upside down in order that top hinge won't interfere when removing pin. Finally, set the third hinge across the ends of the lower rail. These two units, now combined with the hinges, become one end of the 4 x 6-foot bench.

Size of Partitions Is Optional

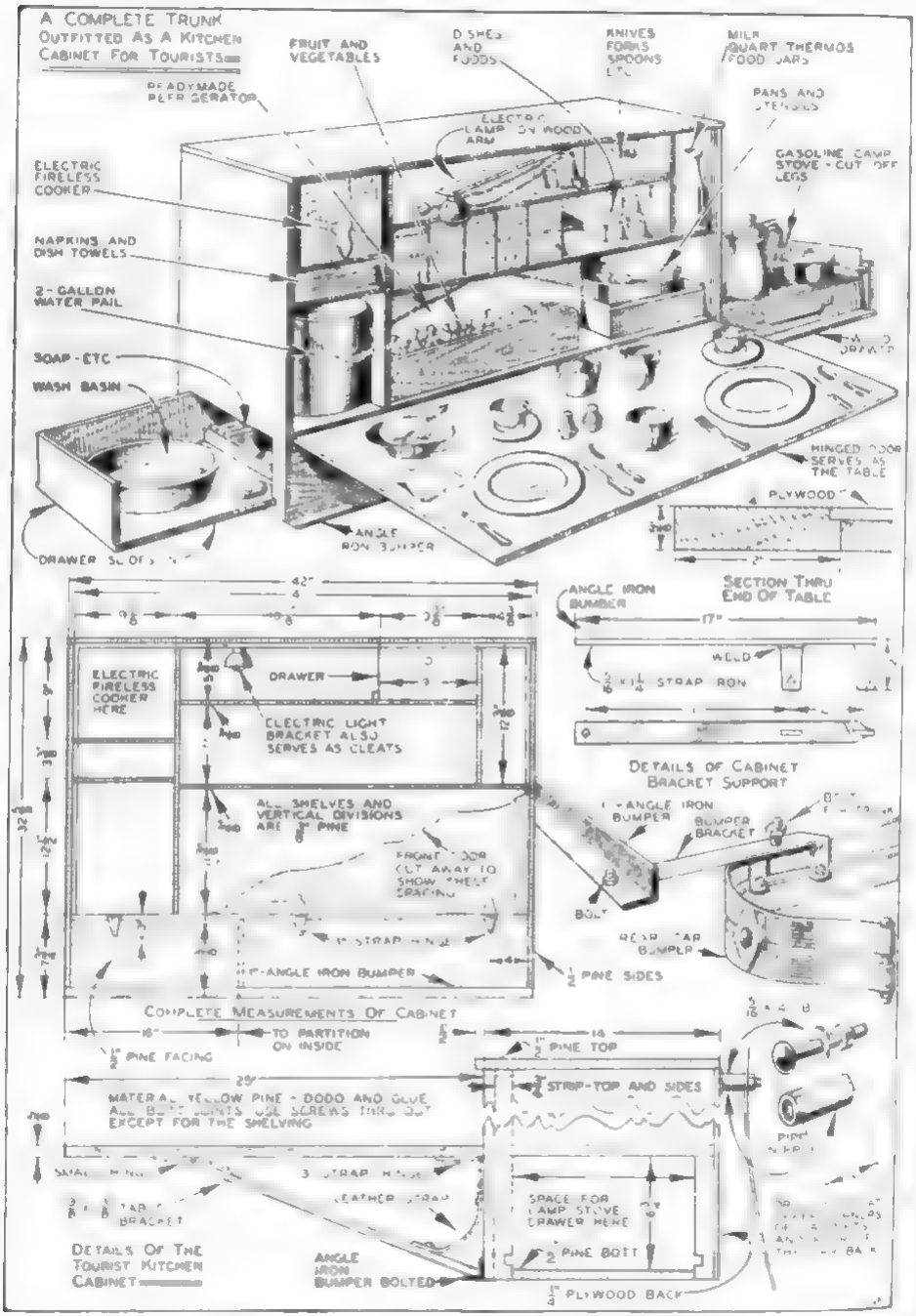
Assemble the other two ends in like manner. Fold them so that the two halves stand at right angles and set them up, the ends of one half in line and 6 feet apart. Next cut the top planks to fit and nail 3 of them in place so that the bench will stand. Now nail the other 3 planks.

The bench is beginning to take shape. Cut the shelf boards and fit them into frame. To strengthen shelf bottom and also to prevent tools and small pieces of equipment from working out, rip 1" x 4" x 6'-0" board in two and cut and nail to the front edge. Cut and fit in as many partitions as you wish, or install drawers.



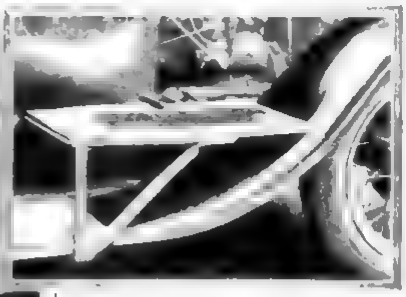
Lower hinge is inverted so that pin can be removed.

Travel-CAMP DeLUXE



in a HOME on WHEELS

Kitchen equipment is carried in this cabinet. Note the table, wash stand, cooking stove, and shelves for food supplies.



View of the running board trunk carrier on which the wardrobe outfit is carried.

Photo shows the outfit in use. Note outdoor sun porch.

by LOUIS F. LEUCK

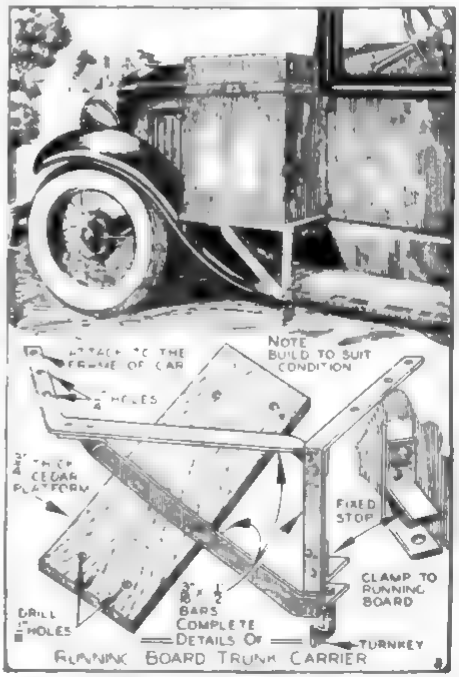
Here is the most complete and compact auto-traveling outfit we have ever seen —kitchen, larder, wardrobe, fireless cooker, bedroom and sun-porch all carried in one car in perfect comfort. Plans presented here can be modified slightly to adapt them to any make of car.

ALTHOUGH modern tourist cabins, with many conveniences, are now almost more numerous than filling stations along our national highways, there still exists within the human heart a strong desire for some real camping. Smoke, dirt, work, and inconveniences that usually go with open air camping make this a questionable pleasure except on short trips.

The camping outfit shown on these pages was designed to eliminate as many of the undesirable features from travel-camping as possible and at the same time keep the open air features intact.

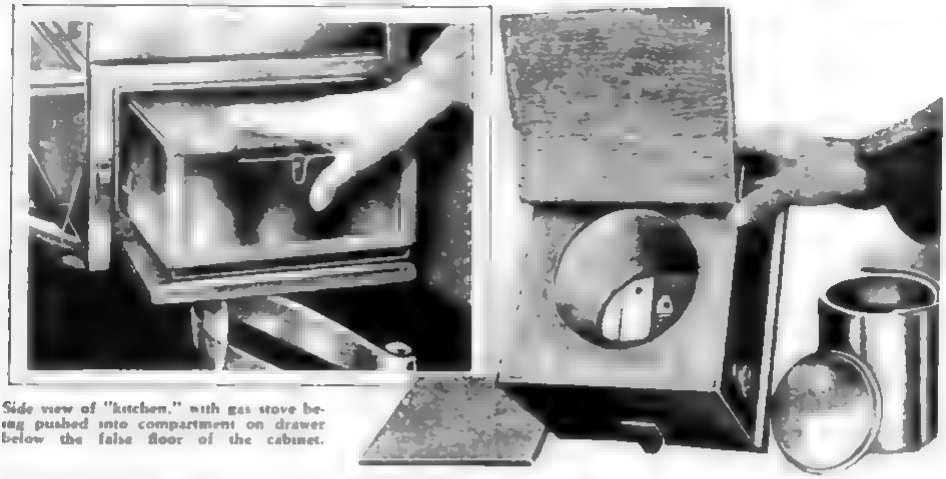
The writer's camping outfit has now been used three summers and is easily good for several more. It is designed for a party of two, though another, especially a child, could be included without upsetting things materially. Cooking equipment and supplies are all contained in a cabinet at the rear of the car. This cabinet is the main feature of the outfit.

Luggage is all carried in two suitcases (one for each member of the party) and an automobile wardrobe trunk. The wardrobe trunk is carried on the exterior of the car. An especially designed rack is used. It consists of a small detachable platform placed forward of the front door

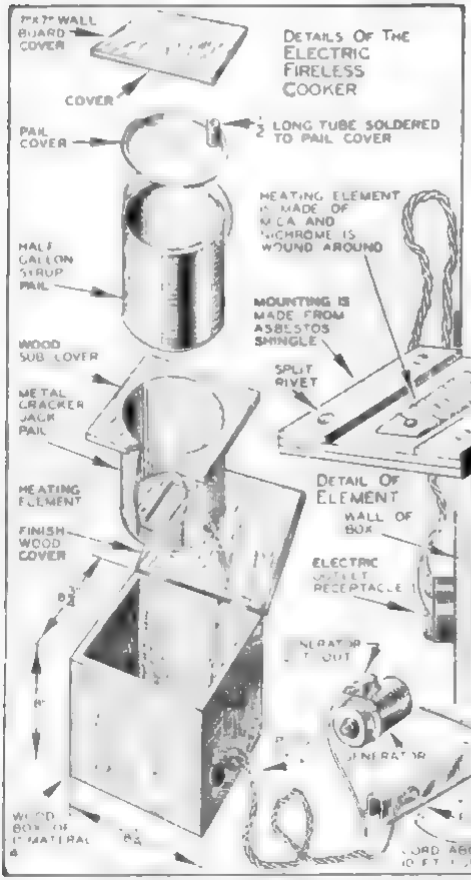


Details of the bracket support on running board of car.

Electric Fireless Cooker Prepares a Tasty Meal While Car is Traveling



Side view of "kitchen," with gas stove being pushed into compartment on drawer below the false floor of the cabinet.



Construction details of the electric fireless cooker. Food brought to a boil and placed in it is deliciously cooked by noon after a morning's drive

Photo of the electric fireless cooker, with the heating element, part of an old electric iron element, partly visible at the bottom. Container is an old one-gallon syrup pa

above the step. It is level with the frame of the car to which it is secured at the forward end. The rear end of the platform is secured to the running board with a clamp arrangement.

In this position the trunk is in view and still does not obstruct the vision. It is comparatively free from splashing mud and dirt, and since it is also provided with a waterproof covering, serves very well as a means of carrying one's best clothing.

The interior of the car is used as a bedroom. Rear and back side windows are provided with curtains, the two front windows of the car are provided with awnings, which may also be used as curtains when privacy is desired. Car seats are used for a part of the bed. When in bed the feet are toward the front of the car. In its normal position the back cushion is higher in front than in the back. This is turned around so that it is higher in the back where the head rests.

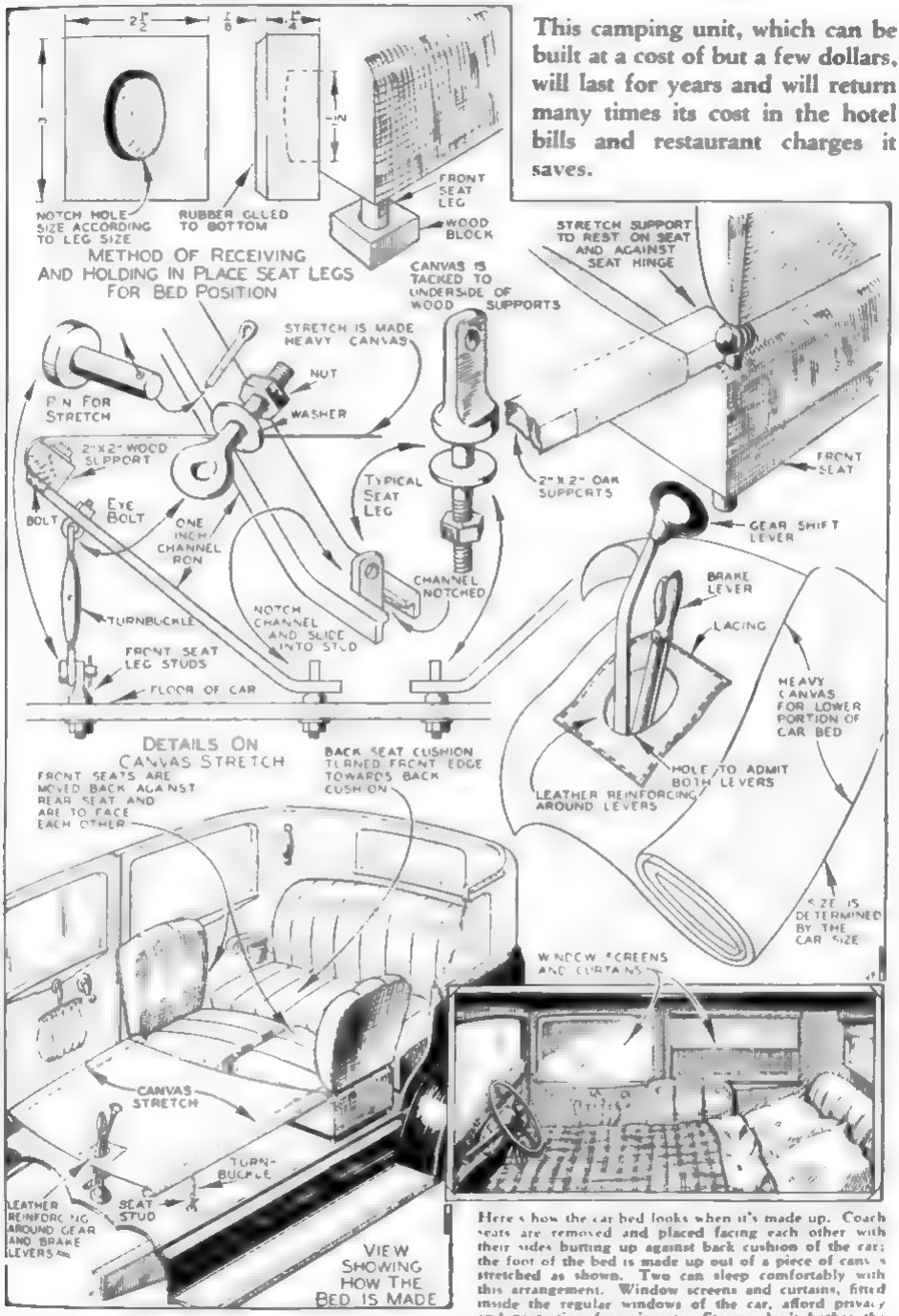
Next, the bolts holding the two front seats are slipped off and the seats turned so they face each other and moved back until they touch the rear cushions. Blocks nailed to the floor with holes properly made in them to receive the "legs" of the front seats, are necessary with the particular type of car shown.

The lower half of the bed is made of a piece of strong canvas

(Continued on page 168)

Bed for Two Comfortably Provided in Car by Arrangement Shown Here

This camping unit, which can be built at a cost of but a few dollars, will last for years and will return many times its cost in the hotel bills and restaurant charges it saves.



In a coach type car, beds can be adapted as shown above.

Here's how the car bed looks when it's made up. Coach seats are removed and placed facing each other with their sides butting up against back cushion of the car; the foot of the bed is made up out of a piece of canvas stretched as shown. Two can sleep comfortably with this arrangement. Window screens and curtains, fitted inside the regular windows of the car, afford privacy and protection from insects. Storms don't bother the occupants—there are no tent stakes to be uprooted.

Balloon Tired Wagons Stop the Clatter of Milk Delivery

This specially-built light weight milk wagon, wearing balloon tires and drawn by horse shod with padded shoes, eliminates all clatter of milk delivery in early morning.

"NOISELESS milk" is now to be had in Boston. This does not mean that the milk makes no noise, but that no racket is created in the delivery of the liquid in the early hours of the morning.

What makes possible the soundless delivery are the new rubber tires with which Boston dairy concerns are equipping their specially-built wagons, one of which is shown in the photo at the left.

No clatter whatever is thus heard in the morning, when Bostonians are trying to grab their extra wink of sleep before rising time. The wagons weigh something like 200 lbs. less than regular wagons, and the tires are 550-200 balloons, carrying about 50 lbs. pressure. Horses wear rubber foot pads, which complete the muffling job.

Gold Teeth May Bring Prosperity

A GERMAN proposal to help end the world depression by saving gold teeth now buried and lost to the world when their owners die has been referred to editorially by the official *Journal* of the American Medical Association.

It has been computed, the editors state, that something like three million dollars worth of gold was buried in Germany in 1929 with the 800,000-odd persons who died in that year.

It would be a simple matter to keep public records of persons whose teeth dentists have filled with gold. When these people died it then might be the duty of some public official to extract the gold to increase the country's gold stock.

Stud and Socket Holds Tie

ONE of the latest additions to the gadgets which go to make wearing apparel more comfortable and convenient for men is the stud and socket tie holder shown in the accompanying photo.

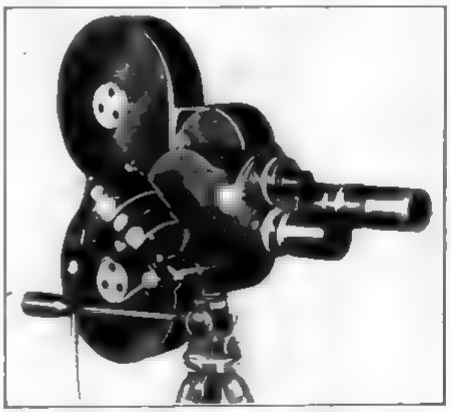
The tie is formed over two metal wings, which fit under the collar, and which has a socket like the receiving end of a snap button. The stud portion of the device looks like an ordinary collar button, and in fact serves the same function as far as the shirt is concerned. The tip of this button, however, fits into the socket on the wing which holds the tie, permitting easy attachment and removal.

Tie is formed over wing which slips under collar, snapping on stud button in the shirt.

Remote Control for Movie Camera

WITH airplane and exploration photography very much in vogue, a demand has grown for a remote control movie camera that would permit the taking of unusual shots. To supply this need, camera engineers have now developed a special motorized camera, similar in every other way to the standard article.

The motor is mounted on the side of the camera, as illustrated below and has provisions for use of the hand crank. The increase in weight is negligible.



Movie camera equipped with 12 or 110-volt motor proves ideal for making remote control shots from airplane, or when filming wild game. Camera has standard dimensions.

$50 Prize to do Witch Stunts

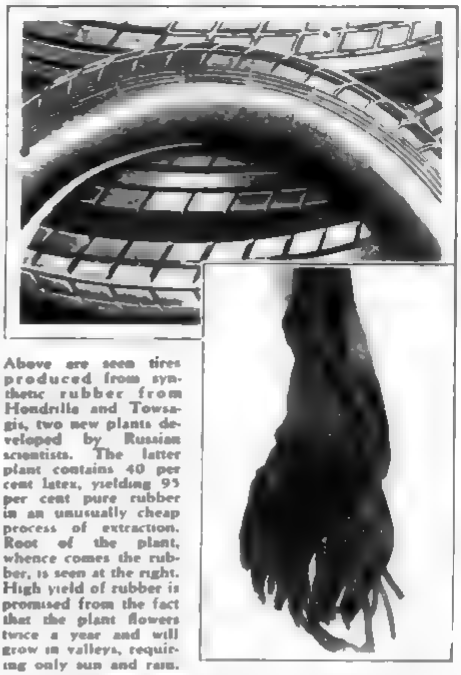
A PRIZE for a successful witch has been offered by a committee of the Christian Council of the Gold Coast, in Africa, an organization composed of several religious denominations active in that part of the world. The object is to convince the natives that witchcraft is false by showing that none of the alleged witch doctors or native magicians who abound actually can do what they claim, even for a prize of $50.

New Russian Plant May Revolutionize Rubber Industry

THE long search which scientists have conducted for a substitute for rubber may at last come to fruition in a new plant which Russian agriculturists have succeeded in growing.

Known as Towsagis, this new plant contains 40 per cent latex and yields 95 per cent pure rubber in a process far cheaper than that now required in the extraction of latex from Brazilian and Malaysian rubber trees.

The first year's experiment with the plant is said to have demonstrated that it would grow in valleys and required only sun and water. Flowering twice in a season, the plant thus has enormous yield, and scientists are cultivating it on an extensive scale to probe its commercial possibilities. The root portion of the plant yields the rubber for manufacture of tires, etc.



Above are seen tires produced from synthetic rubber from Hondrilla and Towsagis, two new plants developed by Russian scientists. The latter plant contains 40 per cent latex, yielding 95 per cent pure rubber in an unusually cheap process of extraction. Root of the plant, whence comes the rubber, is seen at the right. High yield of rubber is promised from the fact that the plant flowers twice a year and will grow in valleys, requiring only sun and rain.

Resonator for Better Radio Music

Tones from loud speaker of new radio device pass down through resonating tubes in which they are reinforced individually and clarified for more perfect reproduction.

TO OVERCOME the indiscriminate mixing of tones which issue from the average radio speaker, engineers have devised a special resonating system which reinforces each tone individually and thus serves to listeners-in music that seems to come actually from the orchestra.

This system, illustrated above, employs a battery of resonating tubes which pick up the tones of the speaker, and a small pool of water which serves as a highly efficient baffle board to prevent reverberation.

Tree Life Gave Man Better Eyes

THE reason why man and his cousin, the ape, possess better eyesight than the other animals is believed to be due to the fact that the primates lived in trees. In this unique residence they had to be able to see clearly objects at different distances so that the space from one tree branch to another could be negotiated without missing.

Tourists' Iron Heats Curling Iron

DESIGNED especially for tourists, this light weight iron is provided with a detachable handle permitting the iron to be carried in the trunk or suitcase. It has a hole in the back for heating a curling iron, and by changing the position of the connecting plug on the terminal studs it can be adapted to different voltages likely to be encountered in traveling.

Ideal for tourists, this light weight iron has detachable handle and hole in base for insertion of curling iron.

How Pilots Ride Airway Radio Beacons

AT THE present time the airway beacon system covers the entire United States and extends north into Canada and south well into South America. Thus if a plane has a receiving set, the pilot can guide his plane along the airways without any danger of becoming lost.

All that is necessary is for the pilot to have a general idea of the frequency used by the beacon stations, a knowledge of the stations in his vicinity and the call letters of the nearest transmitter.

As a general rule all radio beacons use a frequency between 200 and 350 kilocycles. Thus a plane in Ohio can get Cleveland at 344, Dayton at 320 and Cincinnati at 332. Each one of these stations have a special call letter; for instance, Dayton has been assigned 'W' (.——), Cleveland 'K' (—.—) and Cincinnati 'S' (...).

In some cases the stations have a distinctive beacon. The accompanying drawing shows how the beacon at Wright Field, Dayton, has a split beam. This makes it possible for the airman to positively identify the Wright Field beacon while miles away from it.

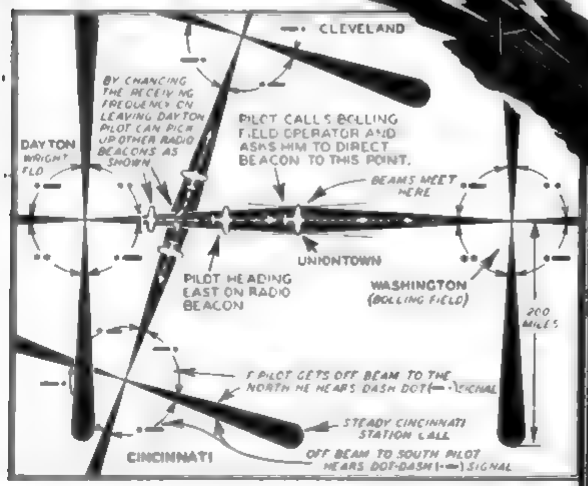
Signals Tell When Off Course

If a plane starts out toward the east, the beacon is set with its beam pointing toward the east. As long as the plane is in the beam the airman hears a continuous signal from the station but as soon as he gets out of the beam the signal changes.

For instance, if he is north of the beam he hears the signal dot-dot (..). If he is south he hears the signal dot-dash (.—). Thus the pilot can keep his plane in the beam without any trouble. The beam spreads very little, as it is but 2½ miles wide at a distance of fifty miles from the station.

The beacon can be heard quite distinctly for a distance of about 200 miles. Accordingly it may be necessary for a pilot to ride several beams to get to his destination. In going from Dayton to Washington, the beacon at Wright Field is directed toward Uniontown, Penna. The pilot guides his plane along the beam until he reaches that city. He then calls Bolling Field and asks the operator to direct his beacon on Uniontown. As the illustration shows, the two beams will meet but the signals to the north and south of the beams will change. Thus while riding the Wright Field beacon to the east, the pilot ran into the dot-dot signal when emerging from the beam to the north. With the Bolling Field beacon he will run into a dot-dash signal. A study of the quadrants around the stations as shown in drawing at left below will show why this is the case.

Receiving set for picking up beacon signals is built into instrument panel.



In laying course for an air field, pilots follow beacon signals directed along path indicated by black lines in above drawing. When plane gets off course signals in quadrant are heard. At right is transmitting station.

SPARKS from the RADIO EDITOR

Edited by L. B. ROBBINS

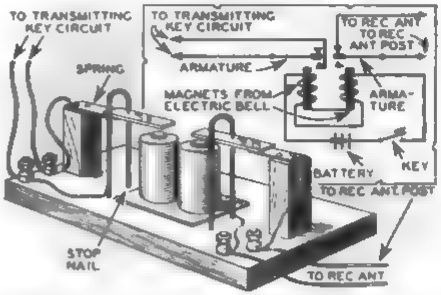
Break-in Relay Made from Bell Magnets

THE amateur with a code transmitter may want to try out "break-in" and for such a system the relay shown in the diagram will prove handy and cheap to build.

Two ordinary electric bell magnets, mounted as shown at the right, are used as the basis of the relay. Also you will need two armatures. Mount each one horizontally as shown on a wooden post so that they can come to rest about 3/16 inch above the post of the magnet. Connect the two ends of the magnets to a 6 volt battery or bell transformer and a key in series as shown in the diagram.

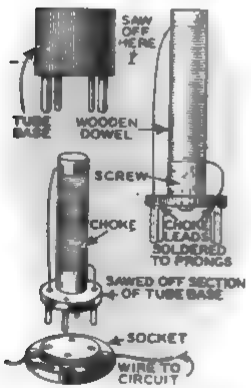
Now under each armature drive a stiff vertical wire through the baseboard so the tip of the wire lies about 1/32 inch below it. This stops the armature from coming into actual contact with the magnet.

In wiring, the wires from key circuit connect to left hand armature spring and to straight wire. On other side connect receiving antenna wire to armature, and hook post to receiver.



Construction of relay. In wiring up, hook straight stop nail in key circuit, and bent stop nail in antenna circuit.

"Variable" Plug-in Choke Coils



Base of tube is sawed off and choke form is secured to the wafer as shown in the drawing above. Contacts run to sockets.

RADIO experimenters often want to change choke coils in order that they may find the one best for the circuit. Plug-in coils are now much used and here is the way it is done.

Prepare a number of old tube bases by knocking off the glass and cleaning out the base. Unsolder the inside leads from the prongs and drill the latter out clean. Then put the bases in a vise, saw off the bottom wafer and drill a small hole in the center.

Now wind the chokes on wooden dowels. Catch the turn end wires with Duco cement and drill a small hole through one end of the form. Fasten this end to the wafer by a screw. Lead the wire ends down into the prongs and solder in place in the tips. Your choke is then ready.

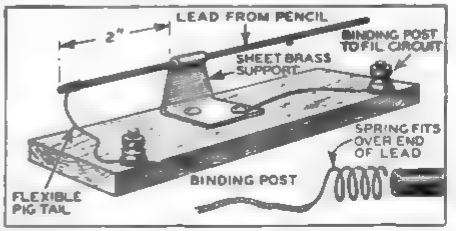
Resistor From a Lead Pencil

HERE is a variable filament resistor that can be used by the experimenter for various types of small receiving tubes. Place a binding post at each end of a small piece of wood for a base. Between them fasten an angle of sheet brass as shown below. Turn the top edge over a small wire nail so it forms a tube to take the pencil lead. Wire the base of the holder to one binding post.

Connect a flexible pig-tail wire to one of the binding posts, and at its other end solder a small spiral spring that will grip the end of the pencil lead as shown.

Split a pencil and remove the lead. Force it gently through the holder tube and slip on the spring on the end. Connect the binding posts into the filament circuit. Sliding the lead through the tube will vary the resistance in the filament circuit.

Two inches of the lead between spring holder and tube will be about right for lighting a 5-volt tube from a 6-volt battery. Use a voltmeter across the tube socket terminal to read the voltage passed by the lead.



Resistance of circuit is varied by sliding the lead from pencil through the brass support mounted on baseboard

Talk OVER the AIR with

Here's what M-M radio enthusiasts have been clamoring for—an easily operated voice transmitter for talking around town to radiophone stations of fellow fans. This remarkable little outfit works down on 5 meters and can be built from old discarded broadcast receiver parts.

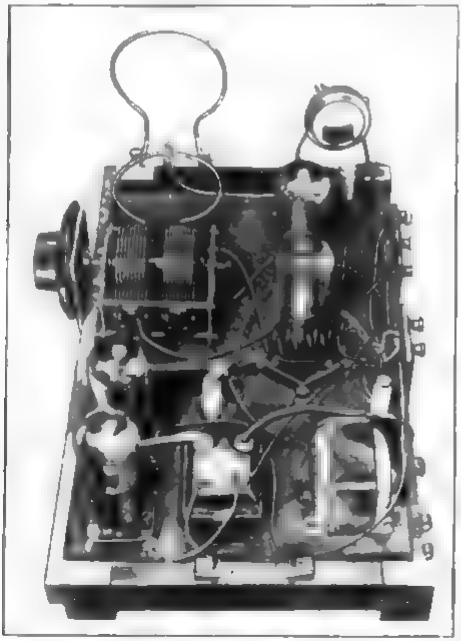


Fig. 1. Here is most efficient arrangement of parts on baseboard. Tandem condenser is mounted on bakelite panel.

by THORNTON HALLETT

FOR several months now radio amateurs have been using the much neglected five meter band (56,000 to 60,000 kilocycles) for local phone work and directional transmission. This particularly because the 80 and 20 meter bands are closed to all except those who pass the special examination for operation in those two bands.

Five meters is exceptionally suited for local work, its effective range being in the vicinity of 15 miles. Beyond that its efficiency drops off rapidly.

The transmitting apparatus is simple in nature, the antenna system is small and its width in kilocycles is wide, 4000 kilocycles, thus allowing many stations to work without interference. The power can be very low and receiving tubes used for all work, both key and phone.

5 Meter Band Ideal for Beginners

Being open to beginners with radiophone this band offers an ideal field to experiment because no interference will be felt from stations just a few miles off and neither will you interfere with them.

The following transmitter will operate nicely within the limits of this band. It is not claimed to be perfection because apparatus for these high frequencies is far from perfected, but it *does* oscillate nicely and in many tests has transmitted well modulated phone signals over ten miles or more with the tubes and power shown.

The transmitter can be entirely constructed of receiver parts and gives the amateur a new target to shoot for in the way of transmitting equipment. Breadboard style of construction has been followed throughout because of ease of adjustment, and no particular "low-loss" methods used. But it works and that's what we are after. So go to it boys. Let's see what you can do with 5 meters.

Circuit Simple But Efficient

The circuit employed is the conventional TNT or push-pull, now so popular with amateurs. Use any suitable base about 10x18 inches. At the rear assemble a binding post strip to include B plus, B minus, C plus, two A posts, C minus, two posts for key and two for the "mike".

Follow the layout of the oscillator section about as shown in Fig. 2 and 3, because it should be as symmetrical as possible to aid in balancing the operating characteristics. That is, plate leads should be about the

this 5-Meter Radiophone

same length, etc., so as not to introduce an unbalanced condition.

As Fig. 4 shows, two sockets are placed with filaments in parallel. Connect the plates to the two stator sections of the tuning condenser. The rotors of this same condenser are joined together and connect to B minus.

Use a gridleak of about 10,000 ohms and connect it in the center of the wire bridging across the two R.F. chokes in the grid circuit. Bridging these chokes is the grid coil. This consists of 4 turns of No. 14 copper wire wound an inch in diameter with the turns about ½ inch apart. The R.F. chokes consist of 18 turns of No. 30 DCC wire wound on a film spool, turns 1/16 inch apart. With a match dowel, glue the spool to the base.

Connect the stators of the tuning condenser to the ends of a 4/5 turn of heavy copper wire or tubing 3 in. in diameter supported in a rigid position. Then at its exact center solder a wire leading to a third R.F. choke, a milliammeter reading from 0 to 100 and to a dropping resistor connecting to the output of a 15 henry, 100 mil audio choke.

This latter can be the primary of a heavy duty audio transformer, if small tubes are used. A "B" eliminator choke will do for heavier tubes.

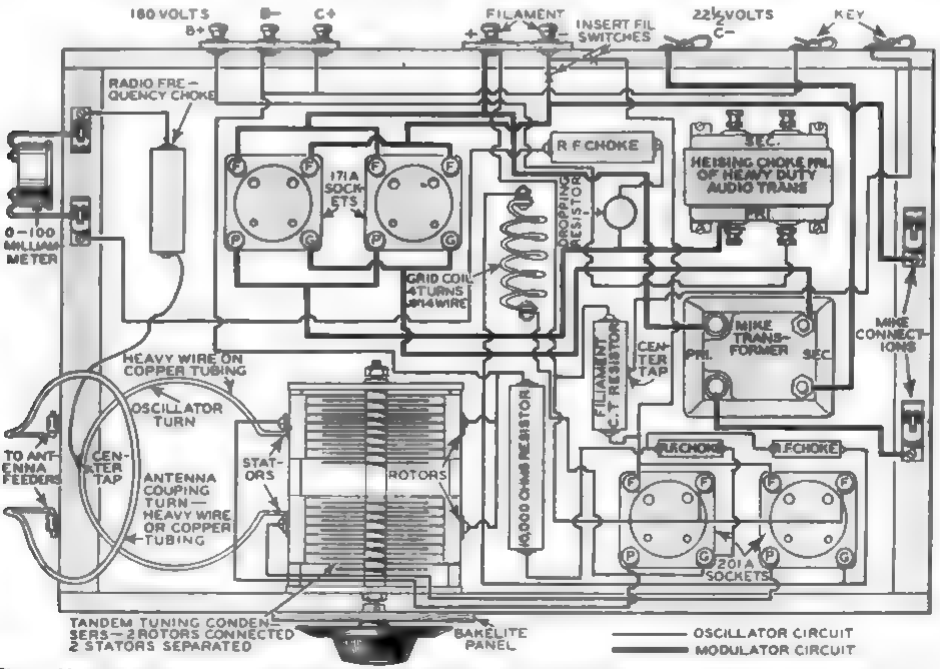


Fig. 2. Here is how various parts are wired up on baseboard. Plate, grid, and filament leads of circuits should be of same length for proper balance of circuit. R. F. choke between dropping resistor and milliammeter should be eliminated.

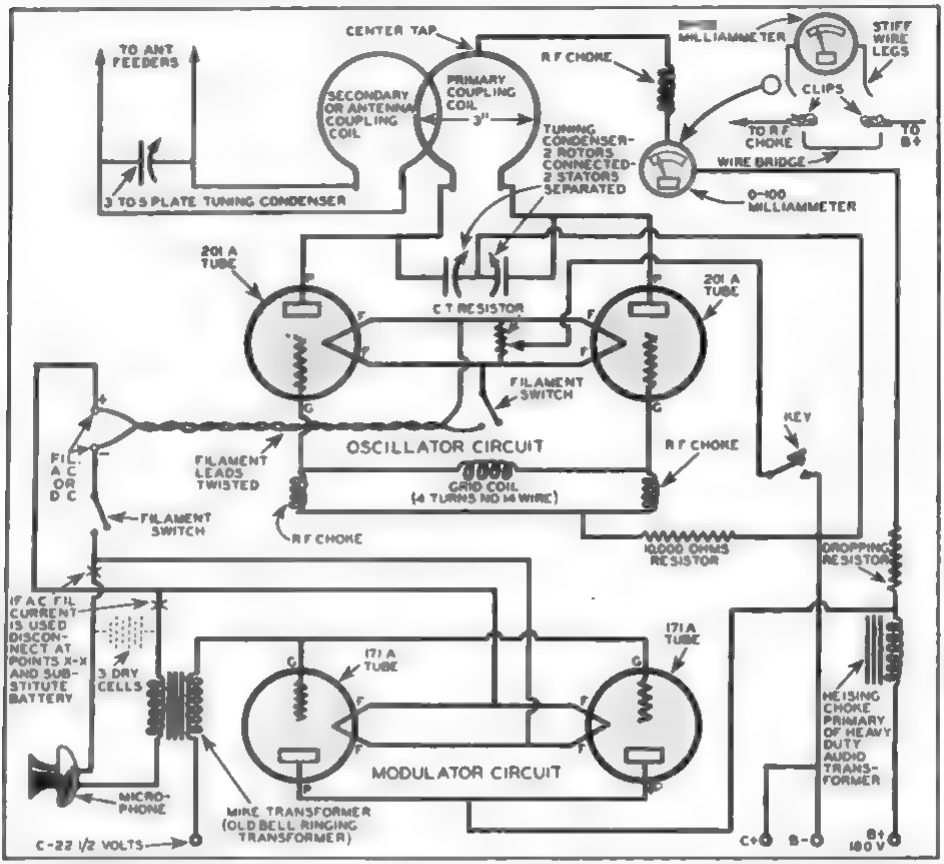


Fig. 3. In hooking up transmitter follow this wiring diagram along with Fig. 2. Note how milliammeter may be inserted or removed from the circuit. Output (8 volts) circuit of mike transformer hooks to microphone; input (110 volts) goes to C minus and 171A grids. If D. C. filament current is used hook up mike as shown in this wiring diagram.

The meter can be made removable from the circuit by fastening stiff wire legs to it and inserting these in two clips in the "B" plus line, bridging them with a wire when the meter is removed.

The filament circuit wires should be twisted and fastened to the symmetrical center of the wires connecting the sockets, as illustration in Fig. 4 shows. Connect a 100 ohm filament resistor across the filament circuit at its center and lead the center tap to one side of the key. Arrange a switch for operating the filament circuit as shown. The other side of key connects to the gridleak (10,000 ohms resistor) and B minus.

The modulator section can be arranged at the right end of the baseboard in any convenient way (See Fig. 1). Wire two sockets in parallel, with filaments, grids and plates connected up in pairs. Connect the plates to the output of the Heising 15 henry choke as shown.

Then connect the input of this choke to B plus 180 volts. C plus post connects to B minus. Filaments of these tubes connect in parallel to the filament source, also provided with a switch.

The microphone transformer can be a regulation single button affair or can be home made, as illustrated in Fig. 4. One good instrument can be made by using an 8 volt bell ringing transformer. Connect the 8 volt output leads to the microphone, and the grids and C— to the 110 volt input side.

Also an old audio transformer can be used. Remove the core, dip coil in hot water and push out the primary. Wind a second primary of 250 to 300 turns of No. 28 or No. 30 wire. This will make a good mike transformer, connecting the primary to the mike circuit.

Microphone voltage can be taken direct from the modulator filament circuit if DC current is used for tube lighting. If AC is used disconnect the mike circuit at points X-x and make it a separate circuit, using

3 dry cells or a storage battery at dotted lines (See Fig. 3). Disconnect the mike from the battery when not in use.

The antenna coupling coil is shown in detail. This consists of a duplicate of the oscillator coil but with legs bent down at right angles and out laterally to rotate in a pair of Fahnestock clips fastened to the side of the base. This is shown in sketch and photos. The antenna feeders are attached to this.

Using a 180 volt B eliminator for power (connected to B— and B+180v) and a 5 volt battery or transformer for filament current, the dropping resistor should be sufficient to drop the B voltage to the oscillator tubes to about 135 volts.

About a 2 watt, 800 ohm resistor should do this using 201 A tubes as oscillators. Using two 171A tubes as modulators at 180 volts use about 40 volts of C bias to gain good quality modulation.

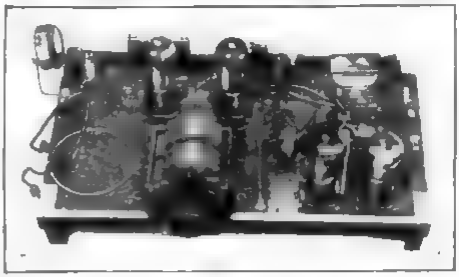
Choice of Three Antenna Systems

Three antenna systems are shown in Fig. 4 top. All are efficient so you can use whichever one suits your location best. The system illustrated at left of Fig. 4 uses a vertical antenna and ground. The vertical portion is about 12½ ft. high fastened overhead to an outrigger and insulator. Ground wire should be about 4 ft. long to point of grounding. Make leads as short as possible to the coupling turn on the transmitter.

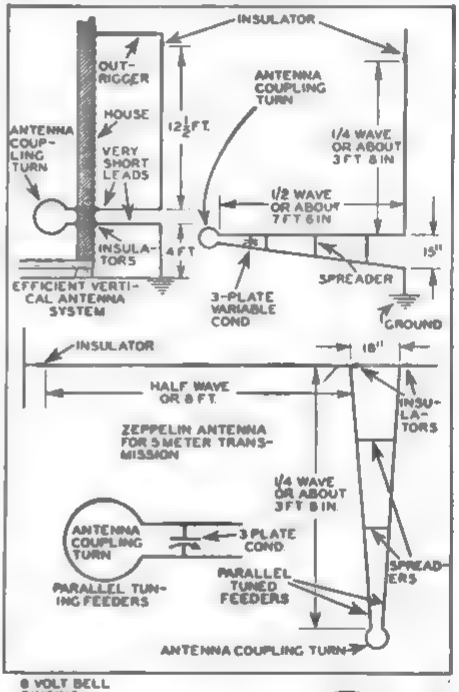
System at the right is similar but the feeders can be ½ wave long or 7½ feet and the vertical portion only 3 ft. 8 in. high. Insert two or three spreaders between feeders to keep them separated.

In the lower system we have the regulation Zeppelin type with a half wave or 8 foot flat top. One feeder is dead ended at the insulator. The other feeds the antenna. Make these ¼ wave long or about 3 ft. 8 in.

(Continued on page 174)



Front view of transmitter. Oscillator tubes (201A's) are at right front, modulator tubes (171A's) are at left rear. Power, filament, key and mike, connections are on rear.



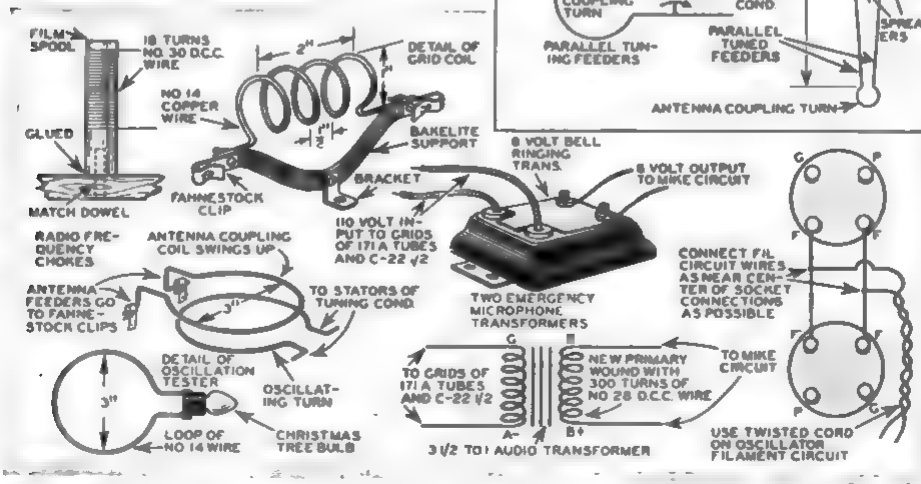


Fig. 4. Top right drawings show most efficient 5-meter antennae for use with transmitter. Lower drawing shows construction of various parts. Grid coil is supported by bakelite "V". Note symmetrical wiring on filament circuit at right.

Vacation Money builds Cabin

You can build this 2-room cottage or backyard sleeping cabin for $200—the sum which an average family of four persons spends on a two weeks' vacation. It will be an investment in happy hours.

Above—The completed cabin. Right—When building a stucco cabin, a firm foundation for cement is made by walling in the frame with composboard and covering it with wire lath.

INSTEAD of taking your family away on a vacation this summer, why not build a small cabin in your back yard or on that vacant lakeshore lot you have and enjoy an "at home" vacation? It won't cost any more than the average family of four spends on a two weeks' vacation and you'll have a summer cottage or outdoor sleeping quarters to enjoy for many seasons. Sounds like a good, practical idea, doesn't it?

Of course the cabin can be built any size or shape you wish, but the simple arrangements shown here are excellent plans to follow. The sleeping quarters are large enough to accommodate four people comfortably and the large living rooms are cozy places to sit around and chat or otherwise entertain yourself. The fireplace adds cheer and a "homey" atmosphere to the cabins.

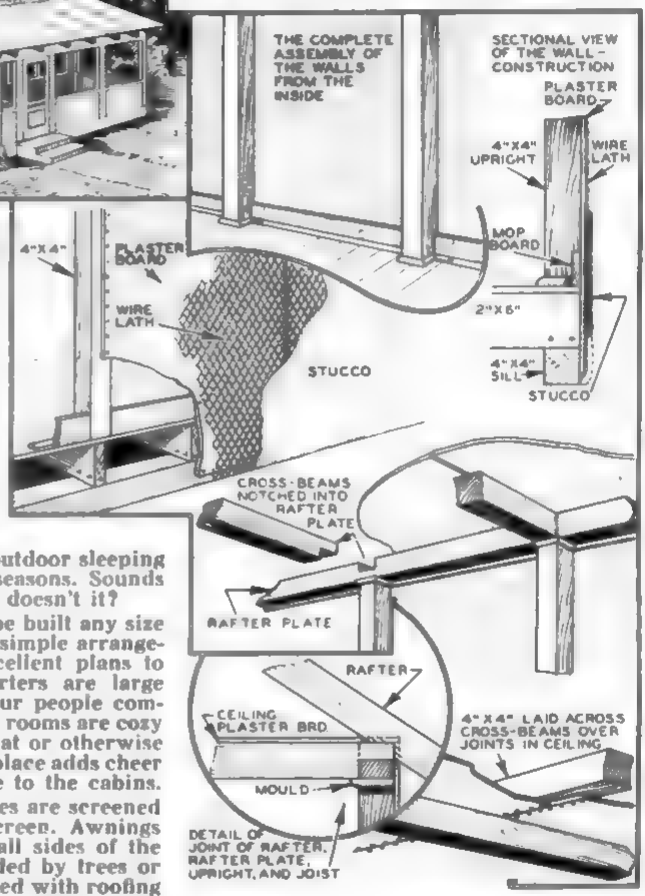
All four sides of the houses are screened in with ordinary window screen. Awnings may not be necessary for all sides of the cabins if they are surrounded by trees or shrubs. The roofs are covered with roofing paper and the entire carpenter job can be done with ordinary tools.

Large Veranda on North Side

The building shown on this page is 14 feet long and 12 feet wide. A veranda 6 feet wide running across the north side and around the northwest corner, as shown in the photo and the diagram, makes a delightful addition to the cabin. The frame posts are 7 feet high but a saving can be effected by making the partition between the sleeping room and living room just head high.

The cabin shown on the opposite page boasts a keen little fireplace. Old bricks for the fireplace and chimney can be picked up at almost your own price. The concrete slab for the mantel can be either cast in your own frame or purchased reasonably from a local cement worker.

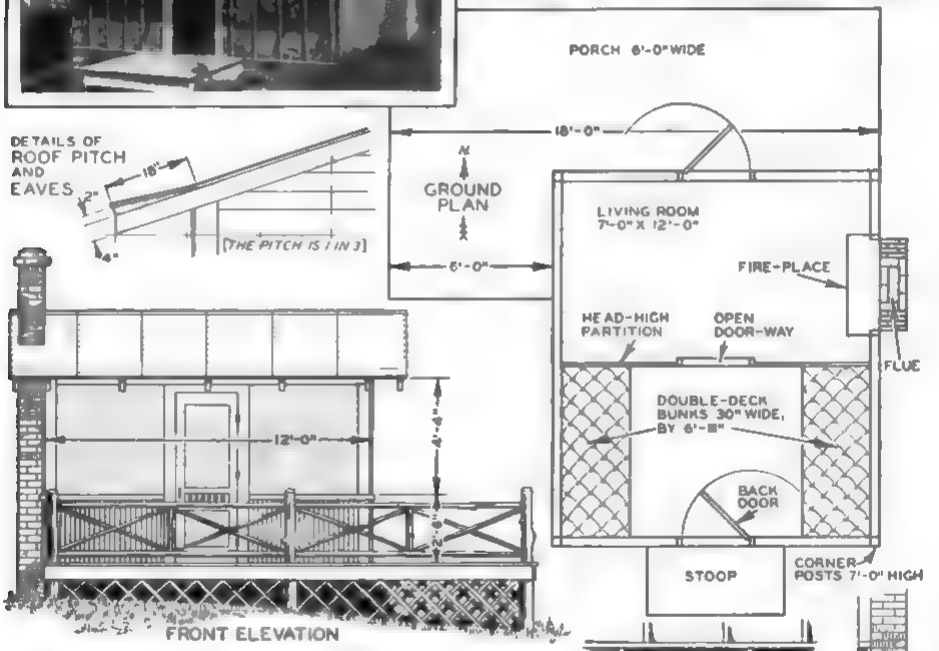
It is advisable to cut a hole in the back of the fireplace so that the ashes can be dropped through the flue instead of having



A beam ceiling is neatly installed by notching the cross-beams into the rafter plates as shown in the above plans. Moulding nailed below the joint finishes off the support.

Complete blueprints on seven different lake cabin designs are available from Modern Mechanics and Inventions Blueprint Department, 529 S. Seventh St., Minneapolis, Minn. Write for free descriptive folder if interested. Price of prints range from $2 50 to $5 per set.

Photos at the top and on left show how your cabin will look from the front and back. The shot on the right brings out the ample width of the sleeping room. Note partition.

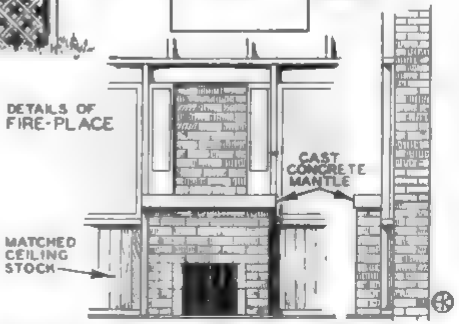


The six-foot veranda running across the north side and around the northwest corner makes a roomy outside porch.

to be swept up. An old stove lid will make a good cover for this hole.

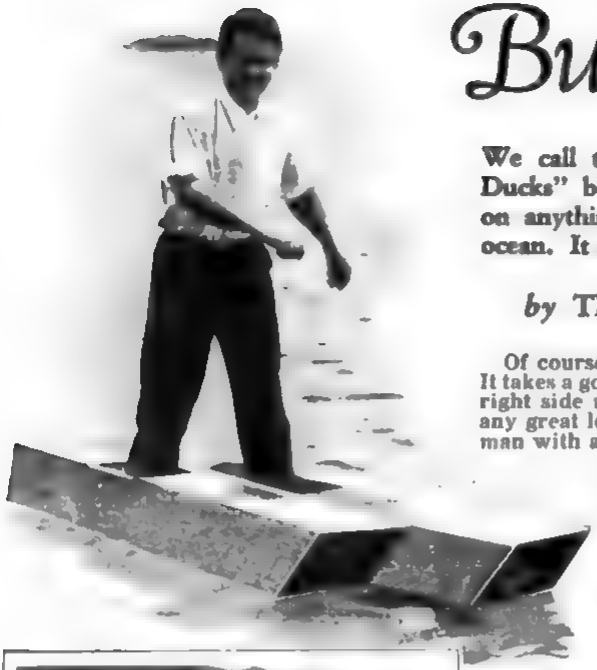
You will find a siding of matched ceiling stock probably the most satisfactory. However, if a stucco cabin is desired, strip in wall board and cover it with wire lath. This makes a good foundation for the stucco to cling to.

If the inside is to be finished off, a beam ceiling, installed as the diagram shows, adds a distinctive touch to the living room and covers up the crack between the plaster boards in an effective manner.



The above diagram shows the interior view of the fireplace. Compoboard panels along the sides of the chimney give it a "finished" appearance. Mantel is cast to shape.

Building a



We call these water skis "Puddle Ducks" because they can be used on anything from a puddle to an ocean. It takes skill to use 'em, too.

by THORNE HANKLEY

Of course, they are not for rough water. It takes a good man to even say he can stand right side up in a pair of these things for any great length of time. Something like a man with a weak pair of ankles putting on ice skates for the first time.

But Puddle Ducking is great fun, and there is this much about it; if you can't use 'em for walking on water, join them together and make a sail boat, catamaran, bicycle boat or what have you. Each shoe is a foot wide, fourteen inches deep and seven feet six inches long.

They can be built of any light, durable wood of about a quarter of an inch in thickness. The drawings on page 142 show what the sides look like when laid out.

The first thing to do is to lay the plans out from the drawings, making them full size.

This can be done on the shop floor on an ordinary piece of brown wrapping paper.

From the side plans, joint up two pieces of ¼ inch planking for each side of the shoe, running battens along the inner seam to hold the piece together.

Prick off the pattern of the side on this wide built up board and cut the boards out to shape.

Then screw in the top and bottom chine pieces, or what the airplane builder would be apt to term longerons.

When each side panel is built, the bulkheads for the front and back side of the foot compartment are put in, and then the top bottom and ends are planked.

Use brass screws and a generous amount of Jeffery's marine glue on each seam to assure water tightness.

The bottom must be provided with a stop which has a hinged flap so that the shoe or ski will progress forward when desired. Otherwise, without these flaps the skis are unmanageable. The drawings show exactly how this stop is built.

Exactly the same kind of shoe can be built up around a light frame work of the same dimensions, and such a shoe will prove useful to autoists and summer tourists.

The frame can be built to the dimensions shown, and being portable, no end of fun

A member of the staff of Modern Mechanics and Inventions tries out the water skis to see if the sport is all it is cracked up to be. Below, how German enthusiasts go at it.

THE editors of MODERN MECHANICS AND INVENTIONS magazine decided, in light of recently renewed interest in water skiing, to build a set of skis and see whether the sport was all it was "cracked up to be."

We built a set of skis and we found out.

The sport is all it is said to be—nay, even a little more, with reservations.

It takes an athlete, and a pretty good one to master the strange technique required in the operation of these funny looking water shoes.

You get into them, and start snowshoeing for some place and you get absolutely no where.

Try to snow ski with them and you go backwards. But gently step out and keep equal weights on each float, and quite some creditable travel can be made.

Pair of "Puddle Ducks"

and instruction may be had from them.

No outdoor sport has become so universally popular in so short a time as water-skiing. Nobody seems immune to the attraction of doing the impossible; young and old, both men and women, everywhere, are this Summer all set to enjoy a brand new warm-weather outing, which calls for a minimum of equipment and supplies, which may be had at small expense. Before them, as in Paradise, unrolls innumerable water arteries which may be easily explored as they calmly glide up or down creek, river, or lake. The thrill of water-skiing along the ocean front is one of the very latest ideas in water sport.

Young Joseph Krupka, experienced snow skier, observed the methods adopted by water insects in easily getting over the surface of ponds. Based upon this idea, he designed a pair of water-skis which, adapted to the need of man, permit us to enjoy a brand new and useful mode of travel.

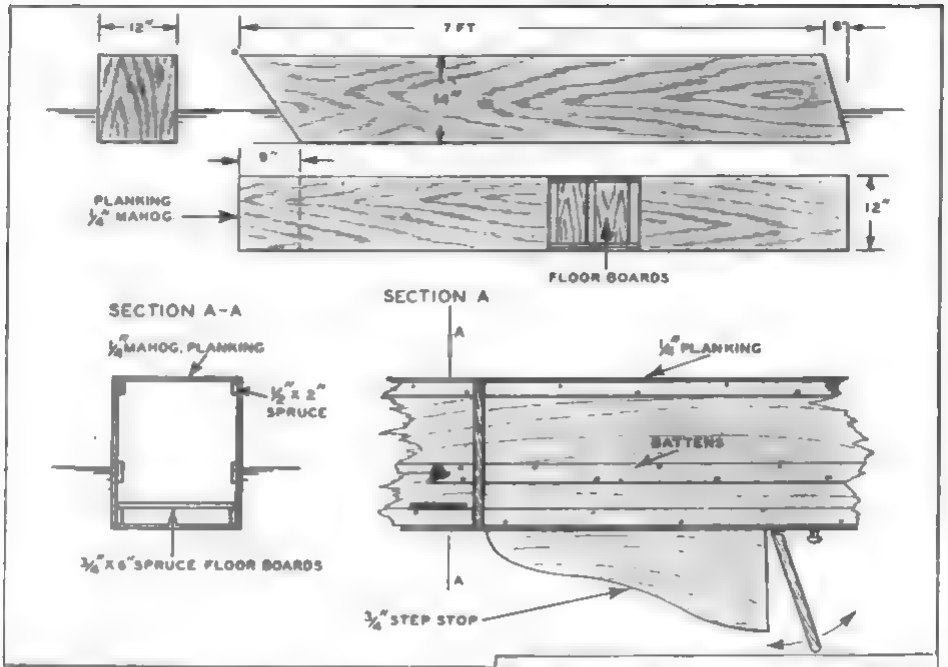
An arrangement underneath each ski—a sort of shutter affair—permits the skier to easily glide forward over the water, as the shutter opens to act as a brake to keep the ski from slipping back and spilling the skier, as he forces the opposite leg forward.

Awkward as appear the water-skis, cumbersome as they seem to one at first sight, yet the beginner is surprised to find the new mode of travel so easily mastered; manipulating a pair of water-skis is as easy, if not easier, than travel on snow with the slender wooden strips, for the reason that there are no bumps or humps in the water to throw the skier.

Few water-skiers take a tumble in the water, and seldom do experienced skiers have a mishap. Even should a skier fall over, he would only get wet, since if he were unable to swim a stroke, he could very easily float to land by catching hold of his skis.

Should a skier fall backward, all he need do is to rest a hand on either ski, press the heels together and slowly raise upright. Falling sidewise, say to the right, means that the skier throws himself backward and pushes the right ski forward with the left hand, assisting in the movement by bending

Above, right, you will see a fair French lass who has evidently gone in for American press agentry—she is carrying her own clubs and walking to the links in anticipation of heavy dew. Below is shown method of building Puddle Ducks.



Each Duck is 7 feet long, 1 foot wide, and 14 inches deep. The frames are built up after the side planks are made from two pieces of ¼-inch mahogany joined together with a batten behind them to form the seam. The bulkheads and end pieces are then put in. The floor boards and a stop piece for walking finish the job.

the right knee inward under the body.

He thus attains the same position as if he had fallen backward, and it becomes easy for him to stand erect.

Should the skier tumble forward, between his skis, which is practically an impossible thing to do, he grasps one ski by its front end, pulls it toward him and rolls sidewise over it into the sidewise position. Then it is perfectly easy to stand erect.

Expert water-skiers perform a trick which amazes those unfamiliar with the technique of this sport. Crouching over his skis, letting himself fall sidewise, he draws his body through the water in a sort of side somersault to the other side and in a second is on his feet again. All these movements would surely end in failure and a bad spill, had not the inventor provided that useful shutter affair in the bottom of each ski, which securely supports the foot as the opposite foot is thrust forward.

Like the snow-skier, the man who travels on water uses a pair of double-bladed paddles to support and assist him in getting about. One in each hand, these are used in unison with the opposite foot—right paddle with forward movement of left leg. After a little practice, one is able to cover three to four miles an hour, while experienced water-skiers are able to travel 10 to 12 miles per hour.

This photograph shows how Puddle Ducks are framed.

Austrian Skier Shows Water Ski Technique; Paddle Makes Progress Easy

Young Joseph Krupka, experienced Austrian skier, tries out his tubular water skis. Note the two connecting braces.

It is not strange that water-skiing is fast eclipsing canoeing as a Summer sport, since it permits one to travel over unlimited lengths of waterways, enjoying a new kind of outing at a minimum expense of money or exertion.

Since the water-skier need not lift his feet each time he takes a step, but may keep his feet on the surface level at all times, merely forcing his legs forward, unlike the man who travels on land, he does not waste his energy in unnecessary lifting of feet. This allows him to tote 50 to 60 pounds of supplies in the pack on his shoulders without getting weary.

The roomy space inside the water-skis may also be used to store a quantity of supplies, such as clothing, shoes, pup tent, and a few provisions. If these are packed so that they evenly balance, they may serve to make water-skiing even more easy, since the weight helps one in manipulating the ski.

Construction Is Light But Strong

Although the skeleton framework which supports the waterproof covering is very light, yet it is sufficiently strong to permit the skier to walk across dry land in making portages, or detours, around dams, rapids, etc. Having crossed a sandbar or island, the skier takes to water like a duck, and continues on his way without the waste of any time. Should it become necessary to travel a considerable distance on land, the skis are removed, folded up and packed in a knapsack which is carried on the back. Carrying this 30-pound pack, the skier travels overland to the next waterway and in ten minutes has reassembled his skis and is again "walking on water."

There are now some twenty different kinds of water-skis in use, though the most satisfactory all around skis are of the type invented by young Krupka. These are of the elongated type, quite similar to the Eskimo kayak, a framework covered with waterproofed canvas, which has been treated inside and out, the seams carefully joined that not a drop of water may penetrate.

Ingenious water-skis have been turned out in the home workshop, some of metal tanks with openings in the top to permit of stepping in, the tanks pointed in front and joined together by use of a bar of light steel. Paul Chicago, who had spent sometime in a Russian prison, invented a pair of metal water-skis of this type, and amazed a multitude of people who attended a regatta on the Chicago River.

(Continued on page 167)

This shows how the backing stop works. A flap strikes the step stop and acts as a paddle for propelling the float forward as one walks along.

Convert Your Motorbike Into a Speedster

NOT long ago, a motorcycle-and-sidecar was seen speeding along the streets of an eastern city, apparently out of control! There was no one on the motorcycle, although the sidecar was occupied by a passenger who appeared not at all concerned by the fact that he was speeding along in a driverless sidecar.

Subsequent investigation proved that the ingenious owner of the motorcycle-and-sidecar had rebelled against the winter elements and had decided that from that time on until the spring breezes once more began to blow, he would ride in the sidecar behind the windshield.

To do this, he found it necessary to fit a steering gear and foot clutch and brake pedals inside the sidecar body connected to the motorcycle controls. Just how he did it is shown in the drawing and photograph below.

Auto Steering Column Employed

To rig up a motorcycle in this manner, it is first necessary to obtain an old automobile steering column and mechanism, which is placed in the sidecar body with the upper end of the column attached to a wooden dashboard. This dashboard may be easily built across the inside of the sidecar body like an automobile dashboard.

The lower end of this steering column projects outside the sidecar and a steering rod runs from the steering arm to a bracket or drag-link fastened to the front fork of the motorcycle. Accurately adjusted, a slight turn on this steering wheel pulls the front wheel of the motorcycle one way or the other, which simplifies the steering operation.

After this change has been made, it is advisable to remove the handlebars of the motorcycle, because they are no longer needed. The two control cables which run up inside the handlebars connecting the grips with the carburetor and magneto should be taken out of the handlebars and carried across and up the steering column where they may be attached to levers on the dash or on the steering column to operate throttle and carburetor controls.

With a little ingenuity a foot accelerator may be fitted on the floor of the sidecar, attached by means of the regular flexible cable to the carburetor of the motorcycle.

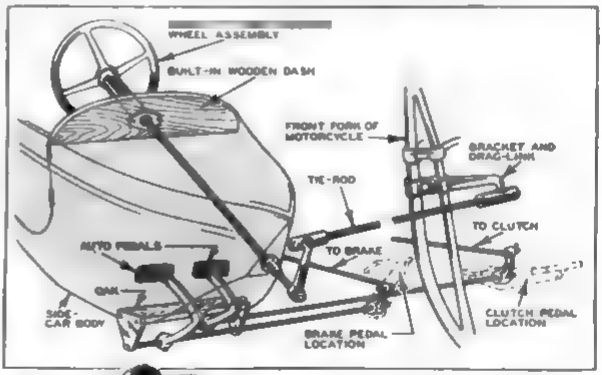
Clutch, Brake Pedals Attached to Cross Board

Next, clutch and brake pedals are attached to a cross board fastened to the metal floor of the sidecar, and the arms of these levers (obtained from an old automobile) are passed through the metal floor of the sidecar. Simple brackets and rods will extend across to the footboards of the motorcycle, operating clutch and brake by simple movement of the feet on the pedals inside the sidecar.

It is not necessary to move the gear shift inside the sidecar for two reasons. First, there is lack of room, and second, the gear shift is within easy reach of the driver's left hand when he wishes to shift.

The motorcycle is started in the usual manner, by means of the kick starter which is between the sidecar and the motorcycle.

Once the controls are properly adjusted, it is real fun to start the engine, settle down in the sidecar seat and speed away.



You have practically all the conveniences of a one-passenger auto when riding in this unique bus, and get a lot of attention besides. Note that bike's handlebars are removed.

Old auto steering column, brake and clutch pedals are installed in the side car as illustrated here. Two control cables which run up inside the bike's handlebars connecting the grips with the carburetor and magneto should be removed and carried across and up the steering column, where they may be attached to dash or on column. The two pedals should be attached to cross boards fastened to the floor of the side car and the arms passed through the metal. Note that the steering column passes through the built-in dash board, on which is secured a windshield for protection of the driver. Gear shift remains in normal position, being in easy reach of driver.

Things to Make with Tools

Edited by A. NEELY HALL

Simple Solution to the Closet Problem

WHERE closet space is at a premium, organization of that space to make it serve its utmost is one of the baffling problems of the household.

A simple solution is represented in this door closet. It may be built upon any type of door and the accompanying drawings of the door closet, open and closed, will convince you of the compactness of the job.

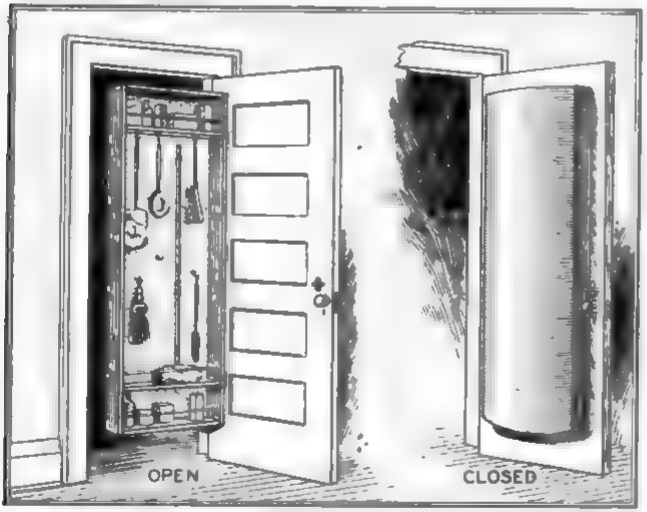
The side rails are 1-by-3 strips, the top and shelves are cut from a 1-by-6 board and the back is of wallboard. The width of the door closet will be determined by the door. The working diagram shows a closet of the right size for a door 28 in. wide and 6 ft. 8 in. high.

Lay out the top by the given pattern, altering the width, if necessary, saw it out and smooth its edges. Then use it to mark the three shelves by. Cut the two side rails of the given length, then bevel one edge as indicated upon the diagram, to meet the curve of the rear edge of the top and shelves.

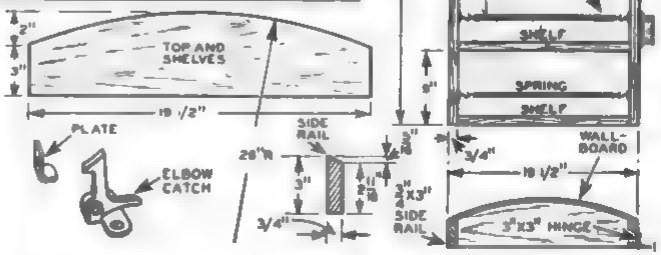
Assemble the top, shelves and side rails. Then cover the back of this frame with a sheet of wallboard. Coat the edges of the frame and the wallboard with glue, and nail the wallboard with nails sold for the purpose. When the glue has set, trim off the edges of the wallboard flush with the framework and smooth with sandpaper.

Shellac all surfaces of the door closet, rub lightly with sandpaper, and apply two coats of enamel or lacquer.

Hinge the door closet with three hinges 3-by-3 inches in size. You may find it an advantage to use pin hinges.



Last word in convenient gadget space is provided by this little closet hinged to door as illustrated in the drawing above. At right are dimensions for closet for use on standard door 28 in. wide and 6 ft. 8 in. high. Open position of closet suggests handy arrangement of cup hooks on under side of the shelf, and hooks in the wallboard back. Spiral spring curtain rods fastened between the side rails will prevent bottles from upsetting and falling from shelves. Hinge with three 3-by-3-inch hinges.



Gate Sign Individualizes Home

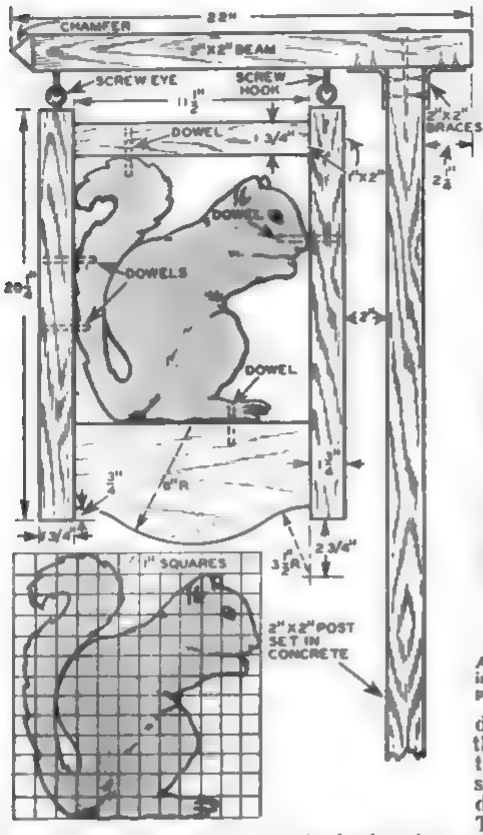


Figure is held in frame by four dowels placed as shown above. Drawing made on squared paper is easy to enlarge.

Above—Completed gate sign shows brown squirrel hunched in a green frame, which is suspended from a white support. Left above—Detailed dimensions and assembly.

A NOVEL gate sign bearing the house number, rural route number, family or "estate" name will give your home grounds a touch of individuality. The center panel cut-out may be of whatever design or figure you choose. Shown in the model above is a squirrel of good proportions which is a good pattern. It has been marked off on squared paper to simplify enlarging to size required.

First, lay out the cut-out pattern on squared paper. Then transfer it to the panel board and cut out with a saw. The frame should be carefully built to fit around the figure. Make the top and side members of the frame of 1-by-2, the bottom part and the cut-out are of the same thickness, and the cross beam and post supports are made from 2-by-2.

Figure Held in Frame With Dowels

After assembling frame with waterproof glue and nails, slip the cut-out panel in the frame and fasten it with dowel pins ¼" in diameter. Holes should be bored through the frame strips and to a depth of ¾" in the cut-out. These dowels are placed as shown in upper diagram. Secure each dowel with a brad driven through frame. Then trim off the dowel pins so they are flush with the frame edges.

In building the sign support, chamfer the 2-by-2 cross beam on one end as shown. Nail the beam to the top of the 2-by-2 post, with the square end projecting 2½". Then brace with a pair of 2-by-2 corner braces screwed in the corners formed by the beam and post.

Frame Attached to Support With Screw Eyes

Procure a pair of screw hooks and a pair of screw eyes for the hangers. Screw the eyes into the projecting tops of the sign and the hooks into the under side of the beam.

Set all nail heads, putty nail holes and sand all surfaces. Then give the sign an all-over coat of green paint, enamel or lacquer, the frame a second coat of green, and the squirrel cut-out a coat of brown. If you can borrow a set of brass stencils they will simplify the lettering of name and number on the bottom of the frame. Use white or black for the letters and paint, enamel or lacquer the sign support white.

Making Novelty Wood Picture Frames Is Profitable Project

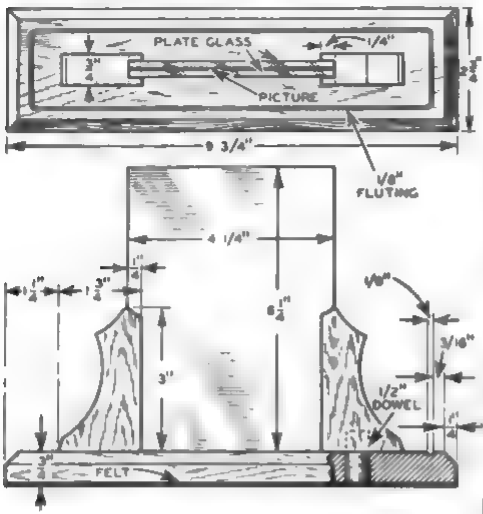


Photo is placed between two pieces of glass held firmly in the grooves on the inside of the uprights. Sides of the glass are beveled slightly and ground smooth.

NOVELTY picture frames which you can sell almost anywhere, either directly or through photographers, can be easily worked up from small pieces of walnut, mahogany or other quality woods. Plate glass should be used, though shock glass, which costs much less, will prove about as satisfactory.

The base of the frame is a piece of wood ¾ inch thick, 2¾ inches wide and 9¾ inches long. Cut the uprights from a 1⅜" x3" block, one edge of which has been grooved just wide enough to take two thicknesses of the glass to be used, plus a reasonable allowance for the photo.

The base edges are beveled, or they can be run over the shaper if desired. Fluting, forming the top border, is cut out with a router bit in a drill press running at its highest speed. When stained, the groove, being rougher than the top, will absorb more and stand out quite dark in contrast when finished.

After cutting out the uprights with a coping saw, they are sanded and fastened in place with short ½ inch dowels, which are glued through holes in the base, as shown.

Spotlight and Turn Signal on Car Top Operated by Lever Above Wheel

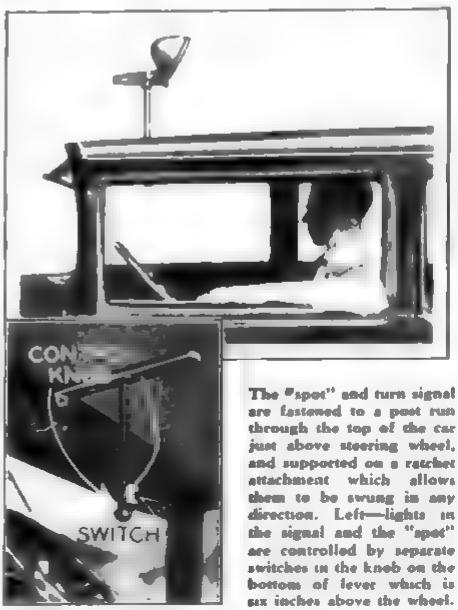
A RATHER unusual combination spotlight and turn signal has been invented by a Minneapolis, Minn., car owner. This new attachment, shown in the photos on the right, is fastened to the top of the car, just above the steering wheel, and controlled by operating a small lever which extends down to within six inches of the wheel.

A red and white arrow and the "spot" are fastened on top of a post and supported on a ratchet arrangement which allows them to be turned in any direction. The lights in both are controlled by separate switches on the knob of the lever inside, which, it is claimed, does not obstruct the driver's vision.

Can Throw Light Beam Where Needed

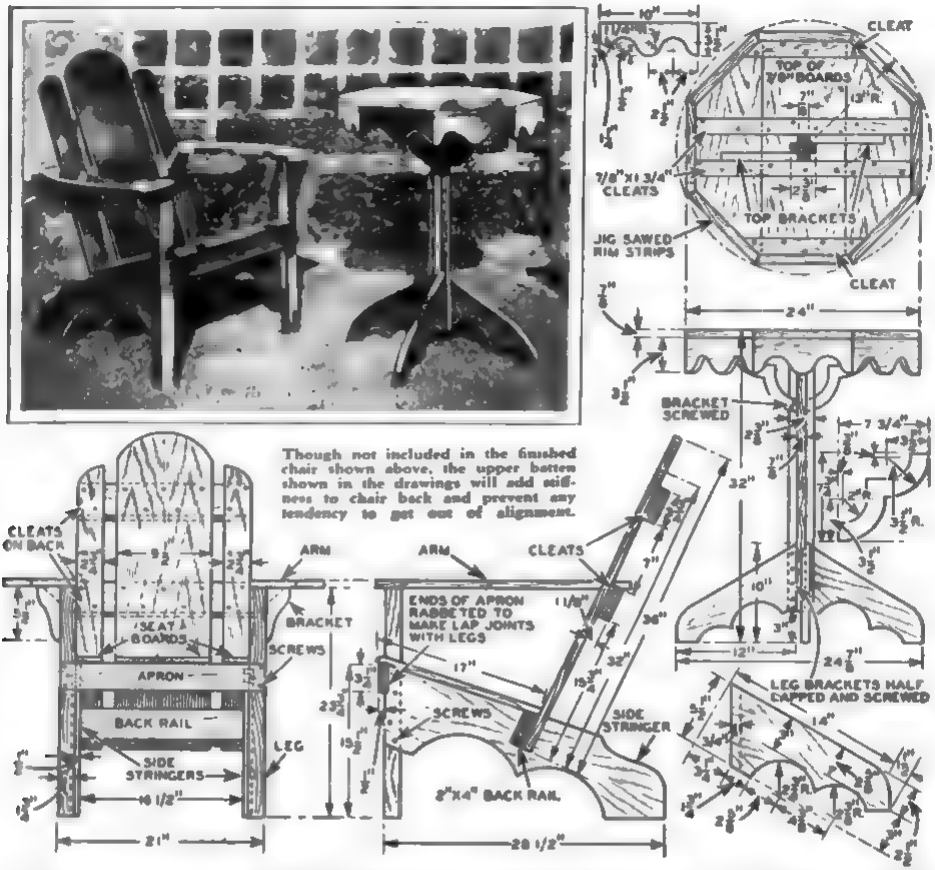
For ordinary night driving the beam of light is shot beyond the hood and focused as desired. When backing up, the light can be raised to focus several feet behind the car, giving a better view than a light fastened to the side of the car.

The arrow is located in a conspicuous place where it can be seen from the front and rear when driver points it. Ratchet joints prevent arrow or light from jarring loose or moving after being set by driver. Lower photo, on right, shows the handy position of the control knob and switch.



The "spot" and turn signal are fastened to a post run through the top of the car just above steering wheel, and supported on a ratchet attachment which allows them to be swung in any direction. Left—lights in the signal and the "spot" are controlled by separate switches in the knob on the bottom of lever which is six inches above the wheel.

Inviting LAWN Furniture



Left above—If no settee is desired, table and chair make a neat combination. Designs for side panels of the table are made by tracing pattern on wood before cutting with bandsaw. The diagram shows details of chair and table assembly.

YOU never sat in a more comfortable lawn chair or settee than those shown in the accompanying photographs. They have been designed with deep, sloping seats, and inclined backs that suggest complete relaxation with refreshments or reading matter, or both, and a table like that in the picture to hold them. These are substantial pieces of furniture for outdoors and if given an occasional coat of paint they should last a lifetime.

When you have installed a set of this furniture upon the lawn the neighbors will want some just like them. You may not have the time or inclination to knock out a duplicate set, but it might be an opening wedge to a profitable occupation during the remaining summer months.

Fir is one of the best woods for outdoor furniture, but if the local lumber yard does not carry it in stock it will probably have something which will serve the purpose. Wood with a close grain is best, and it should be fairly clear, or with knots that are small and sound.

The front elevation and cross section in the above drawing give the dimensions necessary for assembling the chair. Patterns for laying out the curves of such parts as stringers, the arms, arm brackets and back boards are shown in detail drawings.

First, lay out the pair of side stringers upon a sheet of wrapping paper. Use a strip of cardboard with holes punched through it for a nail center and a pencil, for describing the curves, if you lack a compass. With the pattern prepared, cut it out and mark out around it upon your working material. The curves should be cut out on a bandsaw or heavy-duty scroll saw, but a key hole or coping saw will do the work satis-

factorily, though not as quickly. A half-round wood rasp and sandpaper will finish up the curves, removing all unevenness and making the edges smooth. Notice that one end of the stringer is rabbeted. This is done to make lap joints with the legs. Cut the rabbet with a saw, or with a saw and chisel.

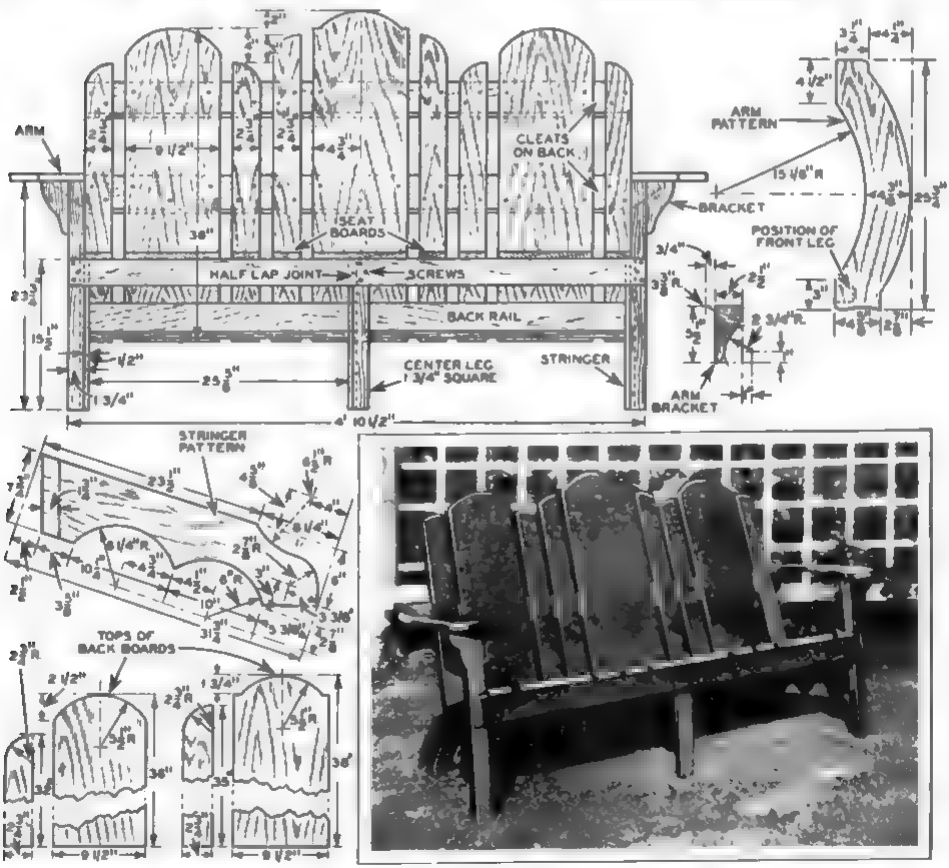
Next, cut the pair of legs out of stock 1¾ inches square, and the apron out of ⅞-inch stock. Notice by the cross-section that the ends of the apron make lap joints with the legs. Rabbet the ends as you did the end of the stringers.

Begin the assembly by joining the stringers to the legs, with screws. Then screw the apron across the front of the legs even with the tops of the stringers. The top edge of the apron must be beveled to the slant of the stringers. Cut the two outside seat boards of the length marked on the cross-section, round the front end of each as shown, and nail them to the top edges of the apron and stringers.

Next assemble the back, fastening the one wide board and two narrow boards with the pair of battens and back rail, shown on the cross-section, at the points located by dimensions. The battens are specified to be 1⅛-inch stock. The lower batten should be fully this thick, since its ends support the arms, but the upper batten may be ¾-inch thick or omitted, as it was on the chair in the photograph. Installed, it will add stiffness to the upper ends of the boards and discourage any tendency to twist out of alignment. The projecting ends of the lower cleat are indicated by dotted lines in the front elevation of the chair.

With the back assembled, slip the back rail between the stringers, close up against the seat boards, and drive screws through

(Continued on page 172)

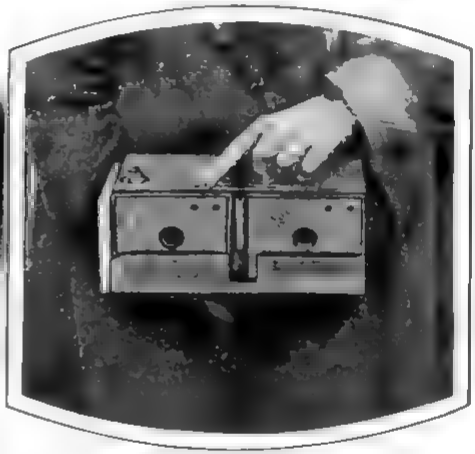


When 3-section back is desired for settee, the middle panel is cut 2" higher than the side panels to give it a novel effect. Upper back batten, eliminated in settee shown in the photograph above, adds stiffness and keeps panels in alignment.

Make Your Own STEREO

In developing stereo photos, the two negatives of the shot can be transposed and printed simultaneously on double-weight paper.

The two cameras are held in a fixed position on the plyboard tray by bolts threaded through the baseboard into the tripod sockets. Shutter bars are connected by wire.



Both shutters click simultaneously when one lever is moved.

REMEMBER the stereoscope and its basket of pictures that occupied the place of honor under the library table for so many years, and the fun everyone had with it? Think of the fun you can have making your own stereo camera, pictures and stereo-folder.

It's really quite simple, and a dandy project for the amateur photographer. Then, too, your friends will enjoy receiving a novel stereo-folder with views of yourself, your home, or scenic places you visit.

Since the stereoscopic picture is necessarily a double-view arrangement — one photo being taken from a slightly different point than the other—the ordinary camera won't serve our purpose. However, two inexpensive box cameras mounted tandem on a thin plyboard tray, as shown in the photos above, make an admirable stereo camera.

Building Plyboard Tray

Three small pieces of plyboard and a few small screws or brads are all the parts that are needed to construct the neat little tray. The base of the contrivance should be just long enough to set the two cameras on, in the manner shown above, allowing about one-half inch between them. The side and front pieces are cut out, as indicated, with beveled top edges, and screwed or nailed to the sides of the base piece.

It is best to complete the tray before fastening on the cameras. Cut out the front piece so that when it is screwed to the base, its upper edge is just under the shutters. A notch is cut in this front ridge, as shown, so that papers kept in this space between the cameras may be easily removed.

Arranging Cameras on Tray

With the tray completed, place the two cameras on it, holding one firmly up against the corner of the ridges and the other against the front brace. They are fastened in these positions by threading bolts through the base board into the tripod sockets in the boxes.

Enough space is thus left between the cameras to supply the necessary difference

in the angle of the two shots. In this space may be kept a strip of black cardboard folded along a cloth reinforcement joint to be used for time exposures.

The lenses in this arrangement should be separated 4½ inches apart. This is an unorthodox arrangement, but has been found in trials to increase the three-dimensional effect of the pictures. Close-ups taken at from 11 to 30 feet and pictures with crowded backgrounds will be found particularly pleasing.

Blurring jar is prevented during the taking of time exposures by holding the black cardboard before the lenses until all the tripod vibration has stopped. Then admit and cut off the light by manipulating the card.

The 2¼x3¼ size film, exposed horizontally, is preferable because a pair of pictures of this size just fit between the wire holders of the old fashioned, standard stereoscope. This, of course, unless you plan to make your own stereo-folder.

Both Shutters Operated at Once

Synchronization of the shutters is obtained by drilling a small hole in each shutter-release bar and joining them together with a stiff wire, as shown in the photo on the opposite page. With this arrangement, if the lever on either camera is "snapped," the other shutter clicks simultaneously.

In printing the stereo photos, the two negatives are transposed; the right film being placed on the left and vice versa. Both may be printed on the same card. If you intend to use these pictures in the standard stereoscope, mount them on a double weight paper or cardboard.

Making the Stereo-Folder

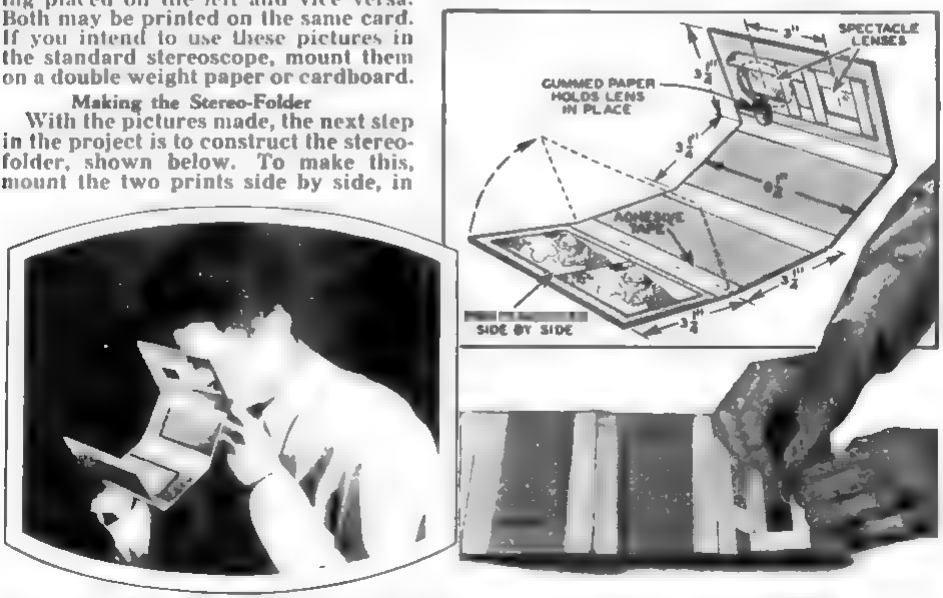
With the pictures made, the next step in the project is to construct the stereo-folder, shown below. To make this, mount the two prints side by side, in proper order, on a piece of cardboard measuring about 3¼ x6¼ inches. At the bottom of this piece of cardboard, hinge a series of three similar pieces arranged as shown in diagram below, and held together with adhesive tape.

In the hinged piece at the opposite end, make two holes about 3 inches apart, measured between centers. In these, mount two magnifying spectacle lenses having the same focus. These can be obtained from oculists or optical firms at a very small cost. The holes should be large enough to permit the lenses to fit inside of them. Then strips of gummed paper or adhesive tape, applied so as to over-lap the openings a little, will hold the glass in position.

Hinges Make Focusing Simple

If the cardboard strips measure about 3¼ inches wide, you can set the lenses at a maximum of 6½ inches from the pictures. This should be ample for all cases. If not, obtain lenses of different focal length. The hinged arrangement makes focusing a simple matter.

This stereo-folder can be folded like a book and mailed as any other photograph. Although it carries its own pictures, other stereoscopic slides can be viewed with it. You may find it advisable to interpose a small separator between the lenses, on the picture side of the mount, to make it easy for the eyes to view their respective prints separately. This can be a hinged rectangle of cardboard.



Stereo folder is made by joining 4 strips of 3¼x6½-inch cardboard together with adhesive tape in the manner shown above. Then paste the print, or the two photos, side by side, on one of the end strips. Mount two spectacle lenses of the same focus in holes in strip at opposite end so that their centers are 3 inches apart. Gummed paper holds these in place.

Handy Stunts for MODEL

Builders of model airplanes will welcome these ingenious kinks and short cuts used by professional builders in large model plane factories.

MOST articles on the construction of model airplanes have one disadvantage —they describe the building of some particular plane, which may be of interest to but a limited number of builders. On these pages I have assembled a number of kinks and short cuts which any model plane enthusiast can apply to advantage to the particular type of craft he is constructing.

To gather this information, I visited one of the largest model airplane factories in Chicago. One of the first models shown me was the sweet Monocoupe job shown in the photo below.

Weighing scarcely half an ounce, it is amazingly sturdy in flying and landing. Most of the framing is 1/16-inch square balsa, which with its tissue paper covering accounts for its light weight. Wing struts are of bamboo, with clever wire snap fittings at each end.

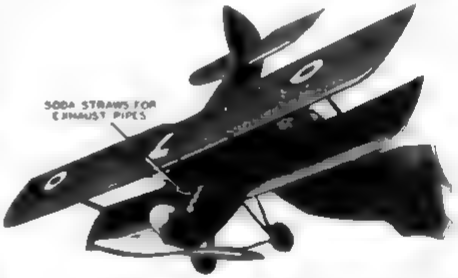
Quick-Change Motor Mount

Perhaps its most interesting feature is the turned balsa nose block, in which the U-shaped, new style propeller hangar is held by the pull of the rubber. As the rear of the propeller is held only by a hook on the stern post, the rubber motor can be unhooked there and pulled out instantly by removing the propeller and hanger unit from the nose block.

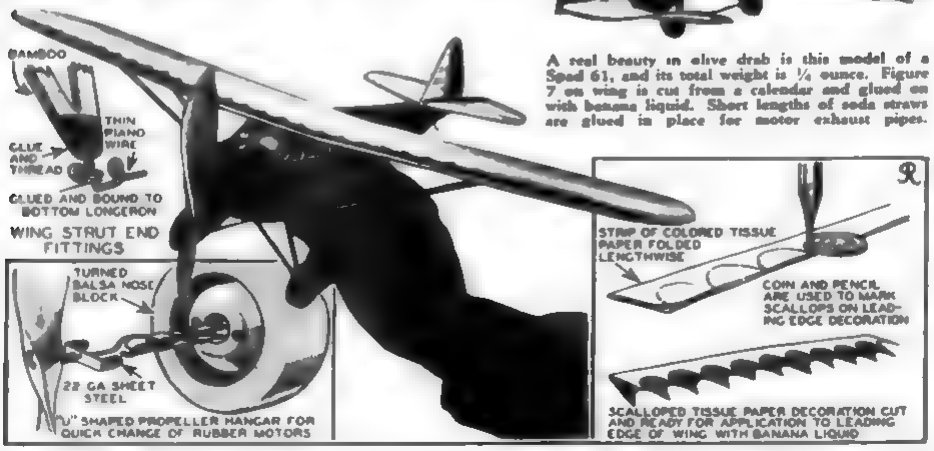
An attractive leading edge decoration for the wing is provided by a folded scalloped leading edge cover made of red tissue paper made as shown in the detail sketch and applied with banana liquid. Cabin windows are covered with cellophane taken from a candy box, glued on with waterproof aircraft cement and tightened with a spray of water.

Another attractive job caught my eye - an olive drab Spad 61 model of wartime fame, also shown below. It is a 15-inch biplane with a weight of ¾ ounce. Motor exhaust pipes are made of short sections of soda straw glued on. The military insignia is made of strips and stickers glued on with banana liquid. Many builders use calendar figures to decorate their ships.

The Inland Sportplane model illustrated herewith is notable for the clever construction of its quickly detachable wing. One of the drawings illustrates clearly how the bamboo struts can be sprung inward with the fingers for instant removal of the wing. Both wing struts and landing gear struts are of split bamboo. Tail skid, wing tips, tail plane, and rudder outline pieces are of 1/32 to 1/16-inch square bamboo bent over a small candle flame. Windshield is

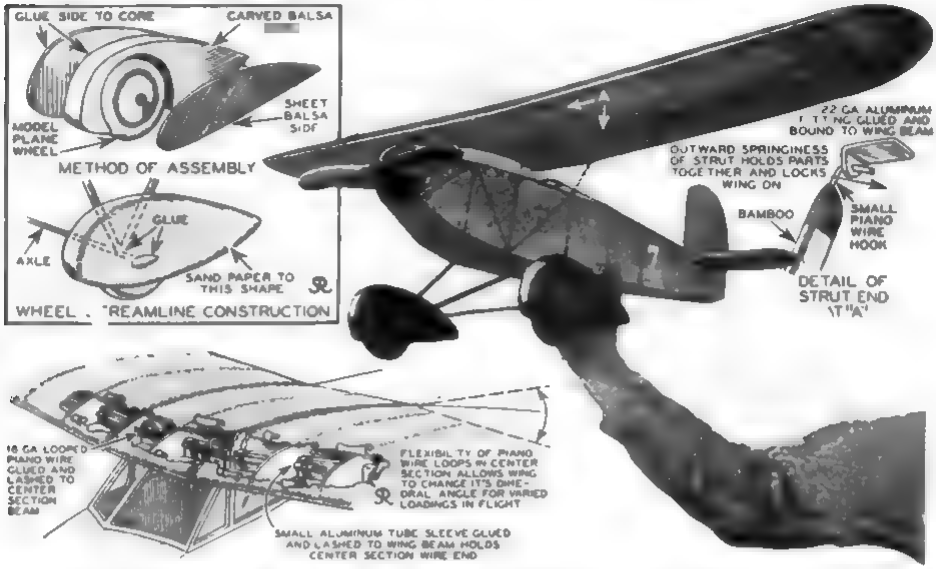


A real beauty in olive drab is this model of a Spad 61, and its total weight is ¼ ounce. Figure 7 on wing is cut from a calendar and glued on with banana liquid. Short lengths of soda straws are glued in place for motor exhaust pipes.



Several kinks which model plane builders will find useful are clearly explained in the above drawings. The model shown is a Monocoupe, weighing a half ounce. Wire snap fittings attach wing struts to wing, and model has a turned balsa nose block of the design shown to permit of a quick change of rubber motors. Colored tissue for leading edge is cut as shown.

Plane BUILDERS — by STEWART ROUSE



Ingenious methods of forming wheel pants, and of mounting the wing of a large model to secure utmost stability in flight, are shown in diagrams. Photo shows model with speedily detachable wing mount, detail of which is shown in diagram.

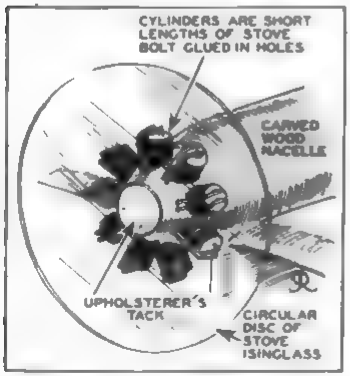
a piece of thin celluloid ambroided to the 1 16-inch cockpit rim. Reed is bent by soaking, forming and drying before application.

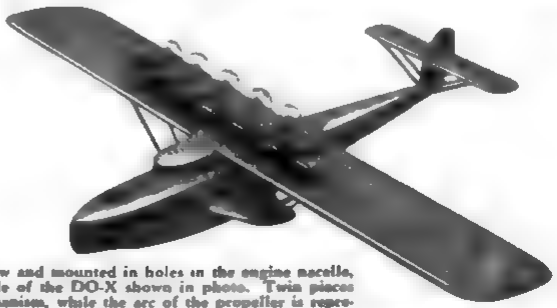
Wheel streamlines or pants struck me as very ingenious. First the wheels to be used are selected, then the balsa core is made to go around them. This core is carved almost to the shape of the finished streamline and then planked on each side with 1/16-inch sheet balsa glued on. When the glue is dry the whole thing is sandpapered to a beautiful streamline shape.

Covering is of colored tissue paper fastened to the framework with banana liquid, tightened with a spray of water from an insect spray, and finally well doped with banana liquid.

A large wooden scale model of the DO-X which I next examined had a number of points of interest, although it is a non-flying model. It has radial engines made of short sections of stove bolt cut with a hacksaw. These sections are glued in holes in the engine nacelles, supplied with wire valve gear and painted black. Disks of isinglass represent the propellers—this material is more satisfactory than celluloid because it will not warp. Portholes are drilled holes painted black inside and glazed with cellophane.

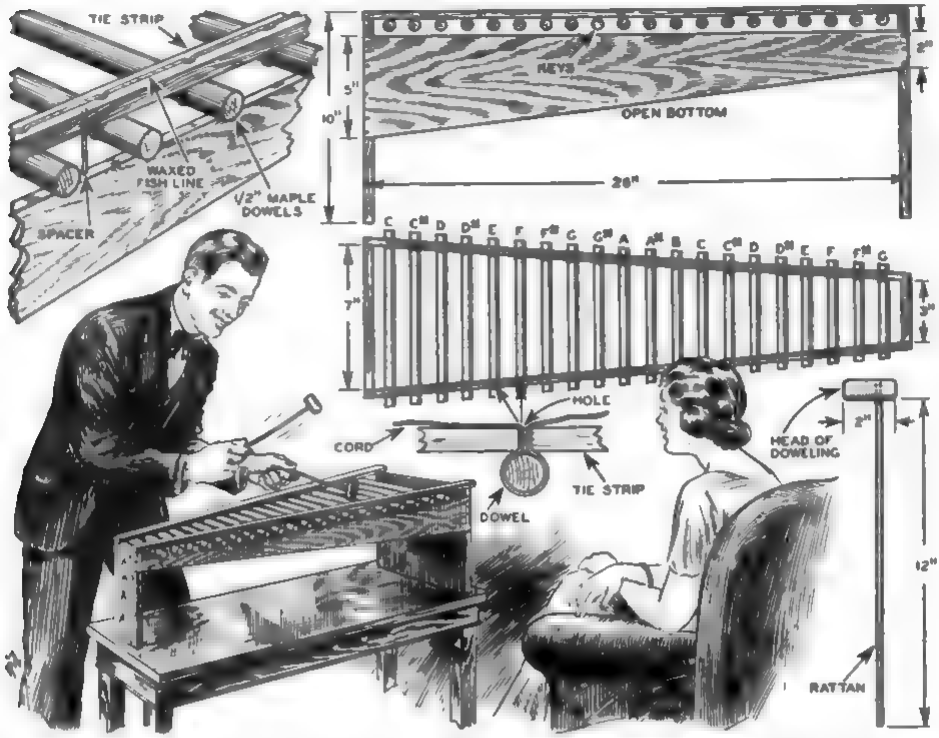
A clever method of mounting a wing on a large model is illustrated in one of the drawings above.





Short lengths of stove bolts, cut off with a hacksaw and mounted in holes in the engine nacelle, make excellent model radial cylinders on the scale of the DO-X shown in photo. Twin pieces of wire bent to shape form the valve lifting mechanism, while the arc of the propeller is represented by a circular disk of isinglass, which is preferred to celluloid because it will not warp.

XYLOPHONE *Easy to Build, Easy to Play*



After the frame has been built, the 20 keys are made by cutting lengths from ½-inch doweling, which are tuned to the proper pitch by shaving off from the ends and surfaces. Then they are marked and slipped in the loops of waxed fishline.

OF THE very few musical instruments that can be turned out in the workshop, the xylophone is perhaps the simplest to make and the easiest to learn how to play. The xylophone shown at the top of the page has a good tone and a passable volume when played with the wooden mallets.

To start construction, procure two pieces of thin hardwood for the sides. These should be 26″ long and 5″ wide. Then cut them so the width tapers from 5″ at one end to 2″ at the other.

For the upright supports you will need one 3x10 inch board and another 7x10 inches. Nail the side strips on the uprights so that they are dropped 1″ from the top. This space is left for the keys to hang in when fastened below keyboard frame.

Construction of Keyboard Frame

The next step is to construct the keyboard frame. This is made of two 1″x26″ strips, which are nailed to the ends of the uprights, as shown. Using a ⅛-inch bore, drill 20 holes equidistant from each other on each strip. Now run a piece of waxed fishline over each strip, pulling it down in each hole so it forms a loop. This completes the frame work.

Now you are ready to make the keys. These are made from 20 pieces of ½-inch doweling and, when completed, will range in pitch from middle "C" to the "G" above the first octave "C". Starting with the lower "C" key, cut and pitch each dowel carefully, tuning it to a piano. Mark each one and place them in position on the frame by slipping the ends through the fishline loops. When all are in position, take up the slack in the line, thus locking the keys in their places.

Go Over Keys to Prove Their Pitch

Go over all the keys again proving their pitch. If sharp, take off a bit from the ends. If flat, shave off a little from the surface.

Hammer handles are made from 12″ lengths of ¼-inch doweling and glued into the heads, which are short pieces of ¾-inch or 1-inch doweling. To finish the instrument, give the frame a coat of shellac or varnish, but do not touch the keys as they would lose their pitch.

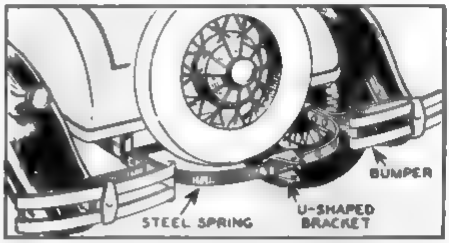
The instrument can be made more ornamental by cutting out the legs with a coping saw, or by working a unique design on the sides with a router. When stained, these grooves will appear darker.

MOTOR MECHANICS

Edited by [illegible]

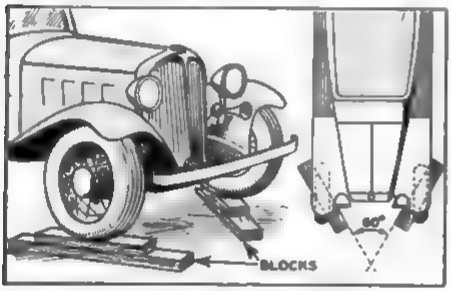
Simple Trailer Coupling for Model A Ford

OWNERS of Model A Fords in need of a simple trailer hook-up will find this simple arrangement a solution to the difficulty. A piece of bumper or spring steel is formed in a "U" shape and provided with holes at each end which match holes in the Ford bumper equipment. The coupling proper for the trailer is a small U-shaped bracket shown in the accompanying drawing, which is clamped to the center of the steel spring. The trailer tongue hitches to a cotter pin through two holes in the "U" uprights.



Trailer tongue fits in the U-shaped bracket, which is secured to the steel spring between bumpers of Model A.

Blocking Up a Car Safely

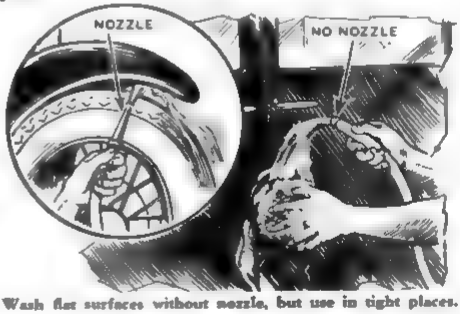


Jacked up car won't fall with blocks under front wheel.

MANY fatal accidents have occurred from a jacked-up car falling on a worker underneath. Often the car, seemingly securely blocked up, can be toppled from its supports by a slight side push against the front fenders. This danger can be eliminated by placing the blocking underneath the wheels at an angle, as illustrated in the drawing above. If the emergency brake is firmly set, it will be found almost impossible to push the front of the car off the diagonal blocking.

Handy Kinks on Car Washing

HERE are a few tips on washing your car with a hose. When cleaning the flat surfaces always remove the nozzle and rub the metal with a good sponge, upon which the water is falling as illustrated below. Such a method will leave no unsightly streaks. For getting up into tight places, replace the nozzle and drive out mud accumulations by sheer pressure of the water. When mud has loosened, make the stream finer and stronger to finish the job.



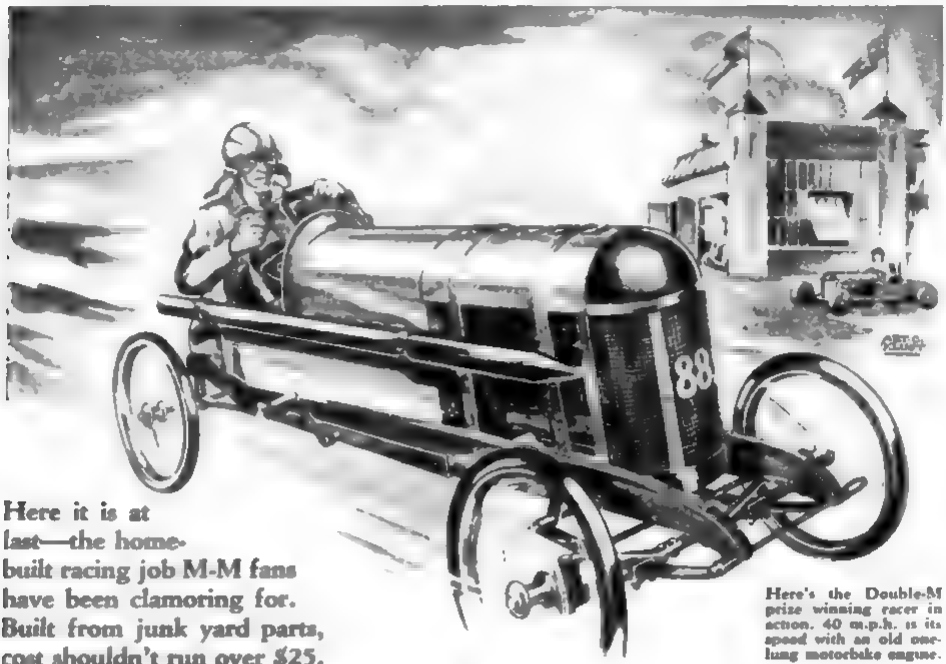
Wash flat surfaces without nozzle, but use in tight places.

Wrap spout with thread as shown.

Thread and Shellac Repairs Oil Can Spout Leak

IT FREQUENTLY happens that the seam on the spout of your garage oil can opens up, making any oiling job carried out from then on an extremely messy job. Soldering is the usual remedial process, but if you haven't the soldering facilities at hand a wholly satisfactory and permanent repair can be made by this simple method. First wrap the spout closely and tightly with heavy cotton thread, as illustrated in the drawing at the left. Special care is required in securing the ends of the thread. They should be tucked in by the method illustrated. Finally coat the wrapping with shellac or airplane ambroid to make the spout absolutely leak-proof. In making repair, cover leak about ½ inch on each side.

Motorbike ENGINE Drives



Here's the Double-M prize winning racer in action. 40 m.p.h. is its speed with an old one-lung motorbike engine.

Here it is at last—the home-built racing job M-M fans have been clamoring for. Built from junk yard parts, cost shouldn't run over $25.

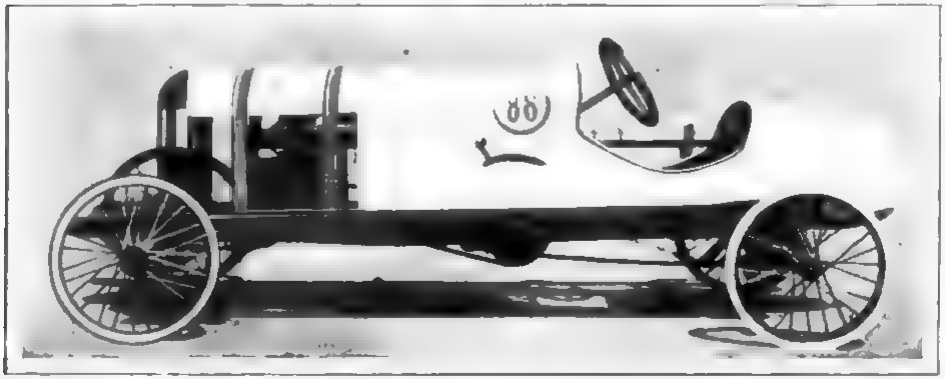
by

CHARLES SCHILCHER

SINCE the publication last December of the winners of the MODERN MECHANICS AND INVENTIONS home-built auto contest, a terrific clamor has been coming from the ranks of M-M readers for plans for some of the keen little jobs that ran off with the honors.

You remember the bus that won one of the prizes, built by Charles Schilcher, of Glendale, New York. Well, we finally wrested plans from him of his little wagon, and we present them herewith to still the uproar for dope on an economical, easily-built, and actually workable car.

Charlie Schilcher claims that he built his car for a mere 25 bucks, and so there's no good reason why you can't do likewise. For parts, all you have to do is raid your near-



Note the trim lines of the completed Double-M racer job. Chassis is of straight-grained hardwood; wheels from bicycle.

Home-built Racer 40 m. p. h.

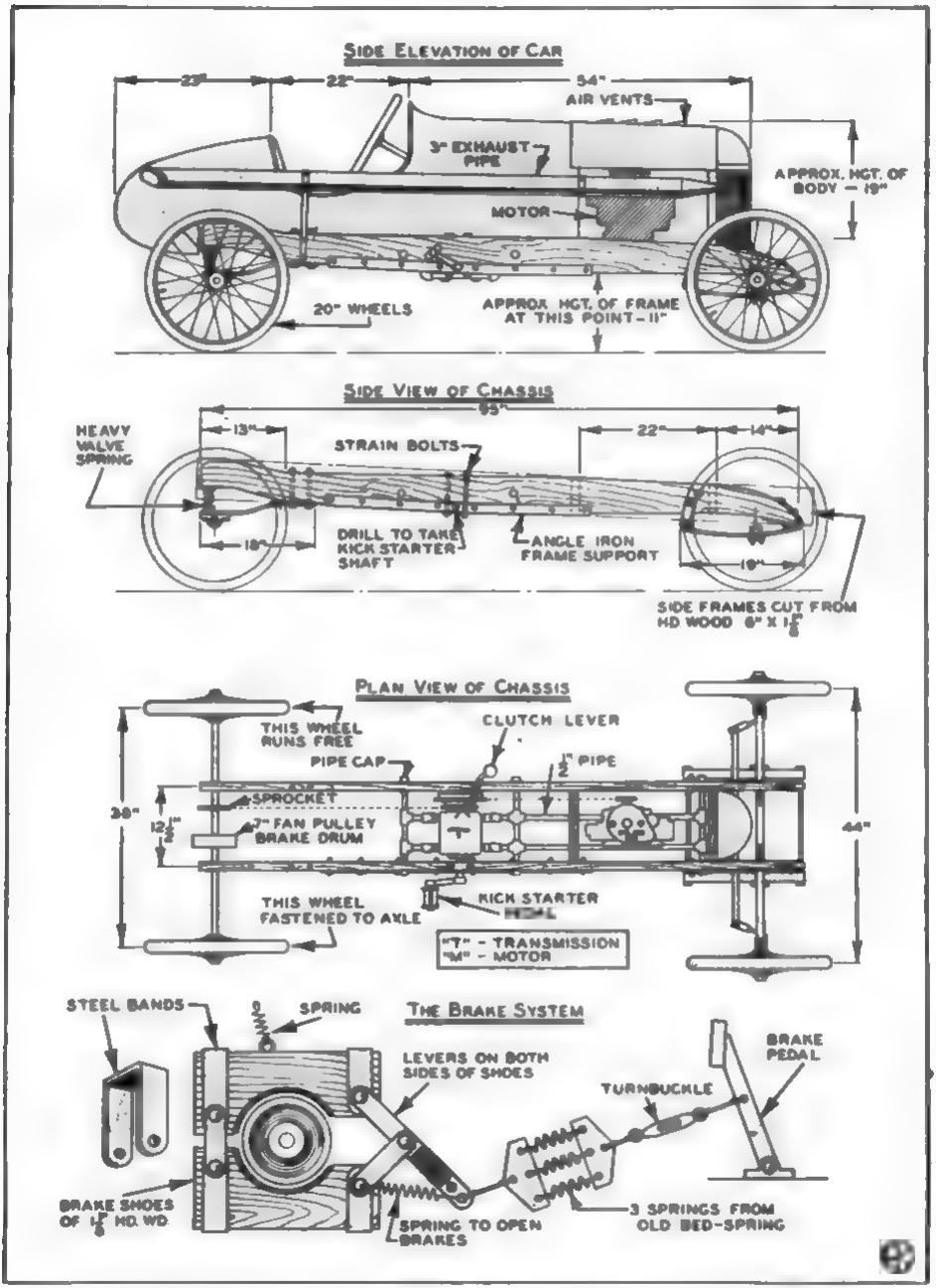


Fig. 1. Layout of chassis and motor installation. In top drawing note that kick starter projects outside. Spring arrangement is seen in drawing below. Motor is mounted between chassis side members on pipe. Brake system is seen at bottom.

Motorbike Engine Is Mounted on Chassis by Frame of Half-inch Pipe

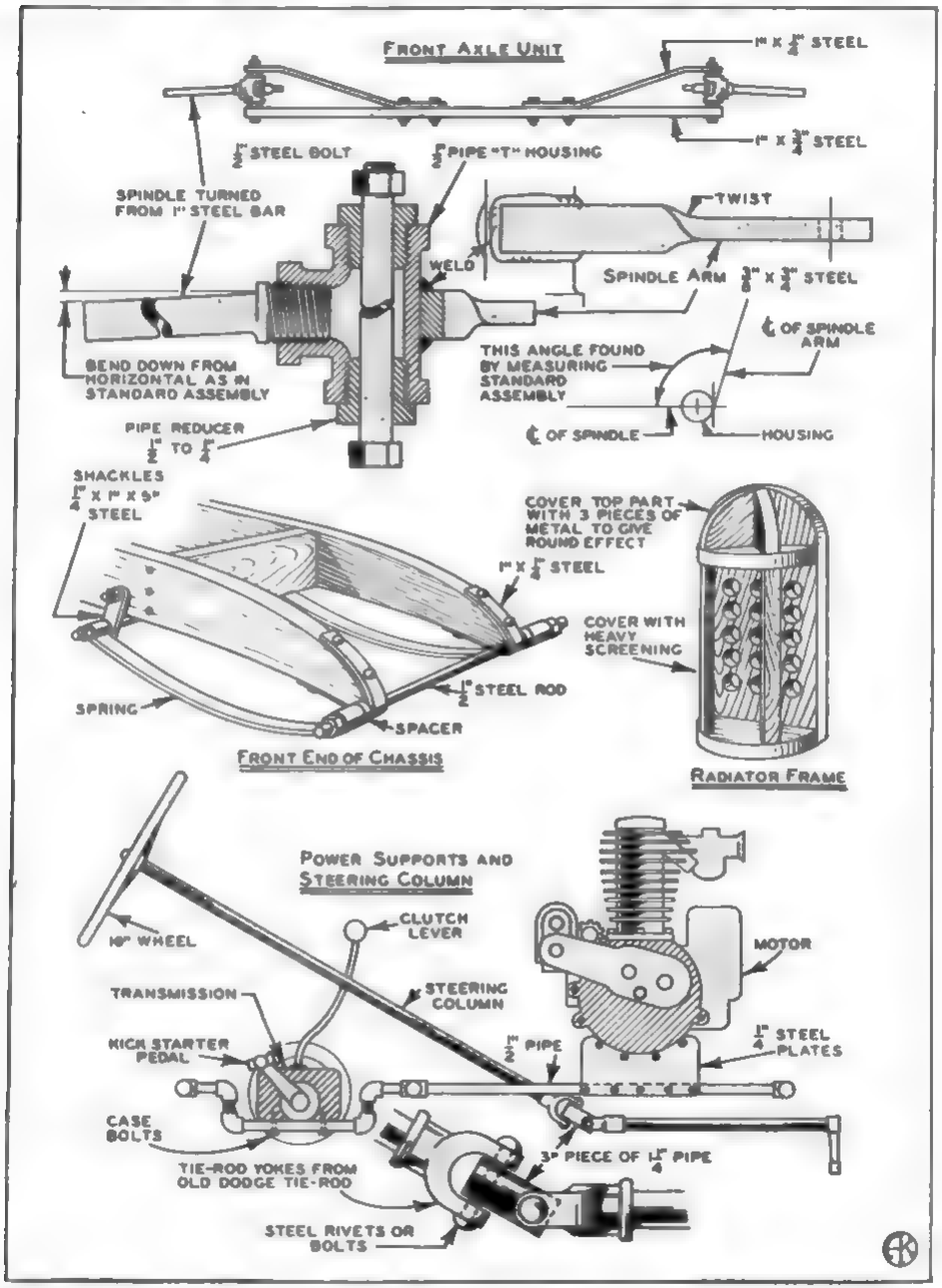


Fig. 2. Basic element of front axle, seen in plans at top, is ½" pipe "T" housing, which takes spindle and spindle arm. Axle is secured to the front spring by means of shackles. Radiator frame consists of back board with two-inch holes drilled in it to allow passage of air to motor. Heavy screening covers the round portion. Below is seen installation of steering column. Note that motor and transmission are mounted on ½" pipe. Universal steering joint can be made from Dodge tie rod. Clutch lever is bent slightly, so that it can project out curved opening cut in tin cover.

est junk yard, like Schilcher did, and exercise a little bargaining ability.

For a power plant you'll need something on the order of a one-cycle Indian motorcycle engine, which is what Schilcher uses. That this little motor will get results is attested in the claims that its 4 horsepower will drive the bus at a top speed of forty miles an hour.

Getting Down to Actual Construction

Now let's warm up to the actual construction of the bus. Your first step will be, quite naturally, to lay hands on the power plant, and then to build up the chassis and the running gear. When this feat has been accomplished the motor and transmission will have to be mounted on the chassis and the chains run to the rear axle to complete the drive.

After this the steering system is installed, then the brakes, accelerator, etc. When everything is in running order, the body framework is shaped up to suit the personal taste of the builder. It's as simple as that.

Now to go into details. Since the chassis is the foundation it's a fine idea to build that part first. Plans for the chassis are shown in Fig. 1, and if you follow them carefully you can hardly go wrong.

Building Chassis of the Bus

The side members are cut out of straight grained hard wood board, 1⅛″ thick. The members are 7′ 11″ long and 5½″ high at the heaviest point, which is the center, tapering to 4″ at the rear and to about 1″ in the front. The chassis is 12½″ wide, having a cross member 14″ from the front and a second one 22″ from that, or 36″ in all from the front.

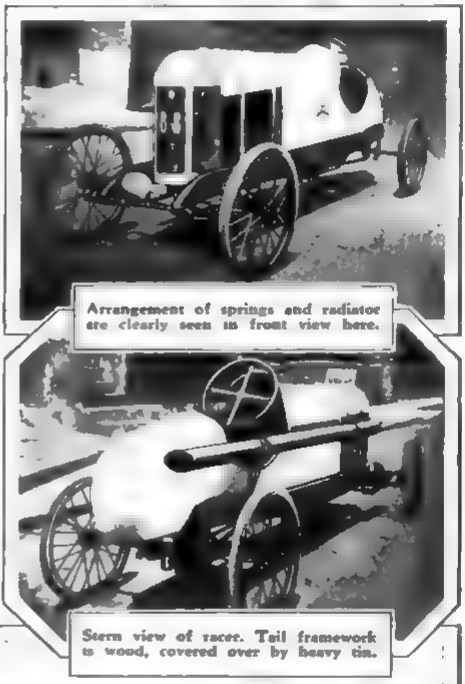
There is still another cross member at the rear, this one being made of angle iron. The two other pieces are only braced with angle iron from a bed stead. On the side where the kick starter comes out, the side member is braced with angle iron underneath, for about two feet on each side of the shaft. This acts as a bearing for the starter.

The rear springs are made of a piece of spring steel 1⅛″ by ¼″ and about 1½′ long, and bent as per the drawing in Fig. 1.

This spring is bolted to the chassis with two 5″ bolts, running through the chassis from the top to the bottom. To the rear of the springs are bolted the bearings for the rear axle. These can be obtained from an old circular saw mandrel. Fasten a heavy valve spring to the rear end of the spring, on which the body of the car rests.

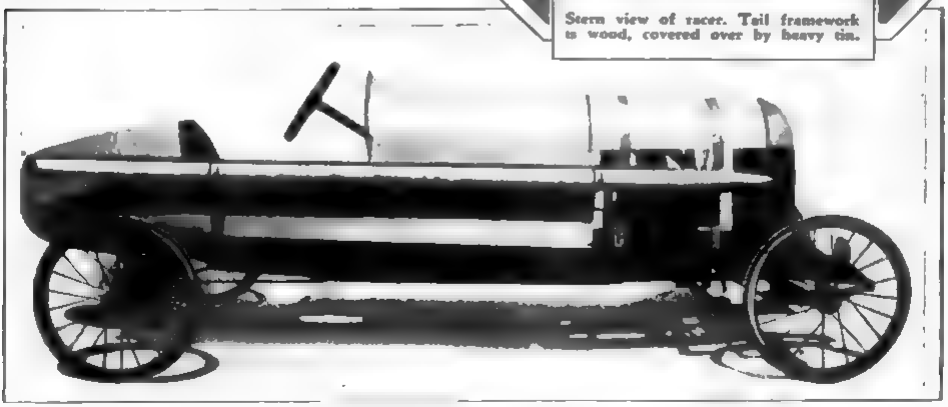
The front springs are semi-elliptic, each being one leaf taken from an old Whippet

(Continued on page 166)



Arrangement of springs and radiator are clearly seen in front view here.

Stern view of racer. Tail framework is wood, covered over by heavy tin.



Starboard view of the racer shows the position of exhaust, made from a 3″ drain pipe. Steering column is made adjustable.

Style INSURANCE Costs You

House from Plan 5-W-48 has last word in style insurance.

Houses naturally depreciate in value as time passes, but the loss can be offset by building with an eye to style insurance.

First floor plan for house No. 5-W-48 shows extra large living room with fireplace and triple window. For complete blue prints for this house or house No. 4-S-46, send $1.00 to Modern Mechanics and Inventions Home Building Editor, 529 South Seventh Street, Minneapolis, Minn. Both houses can be built on fifty-foot lots.

Stairs are always a problem, but in House No. 5-W-48 the designer has solved the problem by concealing stairway behind a built-in divan as illustrated in drawing above.

IF THE average house depreciates at the rate of three percent a year it is easy to see at the end of 10 years your original investment will automatically shrink about 25 percent. At that time the market or resale value of a $5,000 house, other things being equal, would be around $3,500, perhaps less.

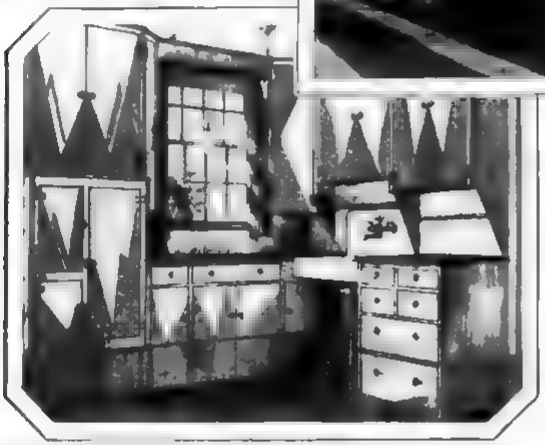
However there's no reason why you cannot employ style insurance as a shock absorber or partial offset against loss due to depreciation. Style insurance is one of the things you pay for whether you get it or not. It costs nothing if your plans are by a skilled designer. So why not get it? It often pays big returns.

What types of houses offer style insur-

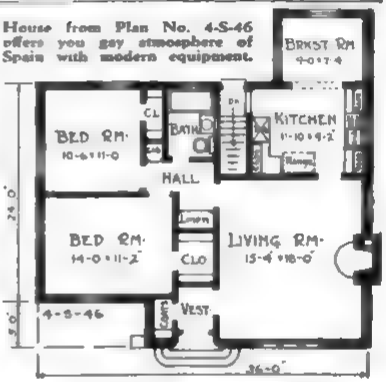
Nothing–PAYS BIG Returns

HOW TO GET A BLUE PRINT AND TWO PLAN BOOKS

A one-sheet blue print of any house appearing in Modern Mechanics and Inventions magazine may be had for $1.00, postage prepaid. Two new plan books, "Homes for Newlyweds," containing 32 of the latest ideas for low cost homes in all styles, and "16 Selected Homes for Lean Purses" containing time, space and labor-saving bungalows, may be had for 15 cents each, or both books for 25 cents, postage prepaid. Address Home Building Editor, Modern Mechanics and Inventions Magazine, 529 South Seventh Street, Minneapolis, Minn.



Modern kitchens should include plenty of cupboard space. Here is one example, with mostly built-in equipment, which has no corners or other space for dust and dirt to collect. Such arrangement saves miles of steps. Enamel surfaces are easily washed and give bright sparkling air to kitchen.



Floor plan for house No. 4-S-46 shows neat breakfast room just off the kitchen for convenience.

ance and reasonable protection against loss through yearly depreciation?

Colonial is a type that has been popular for more than 200 years. It doesn't go out of style. English cottage style wears well. Spanish and Italian are styles a close third in favor.

The past few years however designers have developed what is known as Modern American Style. By using our native materials in new and colorful combinations, by keeping houses rather plain and resorting to subtle variations of roof lines with emphasis here and there on doors, windows, chimneys for sake of variety rather than showmanship, something new and distinctive is coming into favor.

The result is that these new types of houses can be built with a feeling that style will be assured over a reasonable period of years. They are logical, simple, inexpensive houses where common materials have been used uncommonly well by designers who recognize that after all the average home builder wants all his money can buy, and one thing for certain is fair resale value and as small a yearly depreciation as possible.

Plan No. 5-W-48 is a typical example of the type of house I have in mind. It offers style insurance and a fine plan. The lines are severely simple but pleasing. This feature has the added attraction of saving money.

The hooded enclosed entrance breaks the roof line for variety. Notice the clever way the roof has been raised over the front bedroom. These are the little things—subtle variations that add style and beauty without increasing costs.

This bungalow hugs the ground. It's really a stream line body on a practical chassis with all the snap and dash of the latest model in cars. Step inside and see its roomy livable qualities.

The living room is 21½ feet by 11½ feet. A big fireplace is a feature. The triple

(Continued on page 164)

Build an OLYMPIC Monotype Sailboat

(Continued from page 123)

prove to be one of patient and repeated trimming and trying, as a slight misplacement at the stem may throw the sides several inches off at the stern. The sides are fastened first at the stem, by Number 10, 2" brass screws. If the fitting at the stem occupies considerable time, it may be necessary to steam the sides again, for they must be quite flexible so as not to distort the frames as they are bent on. Number 10, 2" brass screws, set 3" apart, hold the sides to stem, chines, frames, and transom. The bottom edges of the sides are placed even with the chines, as the extra width is to be taken off the top edges just before the deck is laid.

The bottom planking is laid from the keel outward, that is, the garboards (the pieces next to the keel and on both sides of it) are laid first, then a piece is laid along the outboard edge of each garboard, and so on. This is done so that any strain will be equal on both sides of the frames as the work progresses. But before the garboards are cut, templates (patterns) are made. These templates are pieces of ⅛" stock, 6" wide, that have been temporarily tacked to the frames and cut so as to fit snugly against the keel throughout the contour of the hull bottom. After fitting, the templates are removed and the garboards are cut according to them. In a like manner templates are made and used for all the other bottom planking. The bottom planking needs steaming for only about a third of its length from the forward end, and is fastened first at the bow when put in place. An hour and a half in the steam box should suffice. Number 8, 1¼" brass screws, set 3" apart, hold the planking to stem, chines, frames, and transom, every other screw along the outside edge being passed into the sides, and the others into the chines.

Boat Ready for Taking Off Form

The outside edges of the bottom planking come flush with the outside surfaces of the sides from the stern to points opposite the forward end of the centerboard trunk. From these points forward the outside pieces and sides are fitted together as shown in Fig. 4, which also shows how the screws are driven so as to give the greatest mechanical strength.

After the bottom planking has been fitted and screwed into place, the overlap of sides and planking is trimmed away flush with the surface of the transom; the bottom and sides are calked, puttied, and finished; and the boat is taken off the form and turned right side up.

The bent oak frames are cut a little more than actual length and beveled at one end so as to fit properly on the keel. No bending form is necessary, but after being steamed for two hours these frames are bent in place in the hull, being held in place by copper clinch nails driven through the sides and bottom planking.

The next step requires considerable care. It consists of measuring up from the chines, perpendicularly to the L. W. L. line, and establishing points, which are then connected by a smooth line, said line corresponding to the "under side of deck" line in the hull lines. The protruding ends of the frames and the sides of the hull are then trimmed down to this line; but in doing so, care must be taken to allow for the slight bevel that is necessary to conform to the slope of the deck.

The floor consists of ⅝"x2½" strips spaced 1¼" and nailed to the floor supports.

The ⅞"x1½" clamps run from stem to transom, being held to the inside of the frames by brass screws. It is on these clamps that the outboard ends of the deck beams rest. Deck supports are mounted at Stations 3 and 4, as shown in the hull detail.

A filler, consisting of strips ¾" square, may be fitted between the frames and flush with top edges of sides, to receive brass screws passed through sides and deck.

The breast hook and mast partner are next mounted in the positions shown, being cut so as to clear clamps and filler. Brass screws hold them in place. A 4½" hole is cut in the mast partner so as to pass the mast and mast wedges. There are eight of the latter.

The beams that support the forward deck provide for a rise of approximately 1½" in the center at the forward end of the cockpit, the beam farthest aft resting on the forward end of the centerboard trunk, to which it is fastened, as well as at the ends.

Planking up to 12" in width may be used for the deck, being screwed to beams, sides, and transom. Deck is then calked, puttied, and finished.

The Deck Covering

The deck covering of 8 oz. canvas is put on in halves, being first secured under the 3¼"x½ combing, and under a 1¼"x½" hardwood strip running along the center line of the forward deck, said strip extending from stem to mast and from mast to combing at forward end of cockpit. Considerable tension must be applied to the canvas in stretching it over the deck, and care must be taken that no wrinkles or creases appear. The bumper strip is of hard wood, 1¼"x⅜", rounded and finished on the outside, and slightly hollowed on the under side so as to clear the heads of the copper nails that hold the canvas in place. The bumper strip is held in place by brass screws ten inches apart. It is optional with the builder whether or not the deck is painted before the canvas is laid.

Fig. F shows how the rudder is put together with dowels and glue so as to prevent warping. A U-shaped strip of ⅛" brass is held in place on the rudderpost by six rivets so as to take the tiller, a cotterpin preventing the latter from slipping out of the mounting thus made. Fig. C-E shows a rudder mounting, of which there are two. The lag screw passes into transom and knee. An axe handle, properly fitted, makes a good tiller.

Centerboard detail is shown in Fig. G. One end of the rope is made fast to a brass yoke bent over the upper edge of the centerboard, as shown. After determining the length of the rope necessary to hold the centerboard in the proper sailing position (see picture) the rope is cut and passed through a wooden ball and knotted. This prevents its slipping down through the centerboard trunk. The centerboard is lowered when the wind is on the beam, being held up out of the

(Continued on page 164)

YOUR OWN BOSS!

SWING away from traffic tangles and car parades. Ride on wherever fancy leads. Breeze over the side roads that wind back into the real country, where Adventure lurks and new thrills beckon you on.

Astride your swift and eager Harley-Davidson Motorcycle you are your own boss—no "back seat driving" to check your speed or cramp your style!

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Build Olympic Monotype Sailboat

(Continued from page 162)

water by a pin passed through the ¼" hole when running before the wind, said pin resting on the brass strips on top edges of centerboard trunk. Lamp wicking is wound inside the washers under the centerboard bolt head and nut, and white lead is liberally applied before the nut is tightened, which makes a water-tight job.

The lead weights in centerboard and rudder are made by pouring molten lead into openings previously studded with copper nails, as shown.

Fig. B is a side view of a handy traveler mounting, of which there are two. The third dimension is ¾". The traveler itself is made of ⅜" brass rod bent in the form of a half oval and threaded at the ends to take the hexagon and wing nuts. The mountings are fastened to the outside of the transom by brass screws, 12" between centers.

Duratite Glazing Putty, which sets in half an hour; and Sea-Seal Calking Compound, which does not set hard, are recommended for their respective uses. Calking cotton and flat lamp wicking are also needed. After using Number 0 sandpaper on all surfaces, a priming coat of white paint is applied, then a final coat of gray on the inside of the hull. Three coats of racing paint (Smith's Green) finish the bottom, the sides taking three coats of white enamel. Number 00 sandpaper is used after each coat, and the final coat is also rubbed with rotten stone. The canvas deck covering receives three coats of gray paint. Combing and bumper rail take three coats of marine varnish.

Mast dimensions can be taken directly from the sail plan. The foot of the mast where it engages the mast step is 1"x2". Wedges occupy the rest of the space in the 1"x4½" recess in the stem. The sheave at the masthead is 2" in diameter, and the gooseneck is mounted 2' 2" from bottom of mast. The stay is 3/16" cable, a turnbuckle being included near the lower end to provide for tightening. From a point 8" above the gooseneck, a sail track extends for 17' 4" along the after side of the mast. There is also a sail track along the boom. The sail halyard is passed first over the sheave at the masthead, then through a block on the deck near the mast, thence to a cleat. The sheet is passed through two blocks, as shown, and held in the hand of the helmsman.

The sail material may be from 5 oz. to 8 oz. duck, the weight depending largely upon the weather in which the craft will do most of its sailing. The battens are 3/16" thick by 1½" wide. A ⅜" rope is sewed to the leech, and guides to run on the sail tracks are sewed to the other two edges of the sail.

In the hull construction, oak and pine may be used wherever hard and soft wood are specified, respectively.

Fig. 3 suggests a steam box construction. Double thicknesses of gunny sack are fastened to frames that fit over the ends of the box during the steaming process. All seams are filled with calking cotton. The box is 1'x1'x12', the sides being of 1" stock.

Fig. 3 represents an old varnish can converted into a steam generator. Water is supplied through the funnel, after first opening the valve. Closing this valve diverts the steam into the steam line to the box. The valves in the end of the tank are opened momentarily to ascertain the approximate water level. A pit is dug under the tank, in which a wood fire is built to supply heat for generating the steam.

Style Insurance Costs You Nothing

(Continued from page 161)

window sheds light and sunshine like a sunporch. Wall space is adequate for the placing of large pieces of furniture.

Both dining room and kitchen are of good dimensions. The latter is equipped with time and labor saving devices, cupboards, ice box, broom closet, etc. Two bedrooms, each with cross ventilation and a modern bathroom, complete the first floor quarters.

On the second floor there is space for two more bedrooms or a wet weather playroom. A dormer added to the rear will make this area still more desirable.

The house is frame construction, shingle sidewalls and shingle roof, the least initial cash outlay according to builders. There's a full basement and a 45-foot lot will accommodate the house. The cost to build? At present day prices the cost should be somewhere in the $5000 range. Maybe more, maybe less, depending upon where and how the house is built.

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While there is no dining room there's a breakfast nook off the kitchen with arched opening. Can't you see this done in modernistic color scheme of sparkling chintz curtains, lacquered furniture, linoleum floor, table china in decorative colorful pattern?

And the kitchen? Finish it, too, with linoleum floor and range and ice box in the newer colorful enamels and you will have eating and service quarters in the attractive modern style.

There are two bedrooms, a fine big living room, a stunning fireplace, a bathroom and plenty of closet space on the first floor. There's also a full basement.

The construction may be of hollow tile with stucco exterior and red tile roof. Or the house may be built of frame with stucco on metal lath Roof may be asbestos shingles or cedar shakes. If preferred the house may be of common brick whitewashed or painted to give the effect of stucco finish.

It should be a house of excellent resale value because of style insurance. And the cost to build is surprisingly reasonable.

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Mechanical Treasure Hunting

(Continued from page 49)

by the map, struck the wall with a small hammer. It sounded hollow. Working quickly, they chipped away the plaster, seized a small chest that had been walled in and departed hurriedly. No one would have been the wiser had not the opened wall and the marks made by the small chest been discovered.

Just as mining claims are sometimes "salted" to convince purchasers or raise additional capital, so also does the bogus treasure hunter work a confidence game that is peculiarly his own and follows closely in the wake of real concession hunting. The best known of all these schemes is the "Spanish Prisoner" racket which is several decades old but still being worked. Briefly, it concerns a letter which the bearer is supposed to have received from a Spanish-American war prisoner he befriended. In gratitude, the prisoner reveals the hiding place of a great treasure. With this letter, the bogus concession man approaches his intended victim and tries to raise money to "search for the treasure."

Crooked work occasionally takes place after the granting of the concession as well as before. When a concessionaire has acquired his concession, raised capital and gone into production he is sitting on the lid of a volcano. Bandits may demand tribute for "protection" as they have done in Mexico and elsewhere in the past. Governments may change and the new administration refuse to ratify the concession, seizing all the equipment the concessionaire has so carefully assembled.

Today the treasure hunting game is active—but secretly so. And, from the sunken pirate city of Port Royal in Kingston Harbor, its millions closely guarded by giant sharks, to the far flung North beyond the Mackenzie river, there are valuable concessions to be had for the trying. The whole chronicle of the successful and the near successful concession hunter may some day be obtainable. As for the unsuccessful ones . . . who knows?

Movies Record Sign Language

(Continued from page 65)

right and left several times. Birds are expressed in a flying movement with the whole hand, and owl by fingers circling the eyes, frogs by a jumping movement with the fingers.

The sign for horse follows that for measuring height of the animal. "He is big horse, he way up here." The right hand back up is drawn from the left to right side of the body, breast high.

The sign for the buffalo, the dominant figure in the life of all the plains Indians consists in bringing the hands, palms towards and close to side of head, index finger partly curved, with other fingers and thumbs closed. Raise the hands slightly and carry them a little to the front.

General Scott is now busy compiling a dictionary of the Indian sign language designed to assist those interested in this primitive and picturesque means of communication, as well as preserve a custom of the first families of America for the American posterity.

Motorbike Engine Drives Racer

(Continued from page 159)

front spring. Any similar type may be used. A piece of steel is screwed to the top of the chassis side member running around the front to the bottom and in about 5".

The spring itself is 19" long, and the ends are bent in a loop so that a ½" steel rod will fit through, and the front ends are thus mounted. The rear ends have 5" shackles, which are made of 1¼" by ¼" iron. They are bolted to the chassis with ½" carriage bolts, having brass bushings on the top ends.

The lower ends have ½" rods which run straight through from one spring to the other at the bottom end of the shackles. They are held in place with washers and cotter pins. These springs are on the outside, and not underneath the chassis. See Fig. 2 for these details.

The rear axle is a round piece of 1" cold rolled steel with the ends turned down to fit the ½" hubs in the wheels. The front axle is a piece of cold rolled steel ¾" by 1", fastened to the front springs with U bolts.

The steering knuckles are made from ½" pipe T's with the axle screwed in to the T. They are fastened to the axle as can best be seen in Fig. 2.

The steering system works the same as that on the Model T Fords, except that I have a universal joint in the steering column. This is made from the tie rod of an old Dodge car, by cutting off the ends that were fastened to the steering knuckles, and putting one end on the bottom of the steering column from the steering wheel and the other end to the end coming from the steering knuckles. The rest of this mechanism is better explained by referring to Fig. 2.

For wheels use 20" bicycle wheels with hubs to take a ½" axle. The right rear wheel is fastened to the axle and the left runs free.

The motor and transmission are mounted in a frame work of ½" pipe as shown in Fig. 1. The framework in turn is mounted in the chassis by drilling holes where the pipes come through and putting caps on the ends to hold them in place. The transmission is sunk 4" to clear the kick starter pedal below the chassis.

The motor (if you use a one-cylinder Indian) is mounted on this framework by means of ¼" steel plates. These plates were originally on the motor in another position, but I moved them to the bottom where they could be fastened to the pipes to hold the motor.

The transmission is from a Harley Davidson motorcycle, with a hand clutch. The kick starter pedal must be taken off and a two-inch extension be welded on. Also the clutch handle must be bent in order to come out of the side of the body.

The chains run from the motor to the transmission, thence to a five-inch gear welded on the rear axle.

The brake drum, shown in Fig. 1, is a 7" fan pulley taken from an old car. This has a 1⅛" face. The shoe is made out of 1⅛" hardwood and reenforced with steel, and is lined with regular raybestos brake lining. There are three bed springs in the brake rod to even the pull. There is also a turnbuckle in the rod to adjust the brake.

The car from radiator to tail is 2' 3" long—the

Motorbike Engine Drives Racer

hood is 4′ 6″ long, the driver's cockpit 22″ long and the tail 23″ long. These dimensions are shown in Fig. 1.

The radiator is 22″ high, 12″ wide and 5″ deep. See Fig. 2 for this. It is made on a design similar to that used on the Miller race cars. The back board has a number of two-inch holes drilled in it to allow the cooling air to reach the motor.

A duplicate of the back board of the radiator is bolted to the second cross member of the chassis, the radiator being bolted to the first. This rear board acts as the fire dash and is faced with tin. The gas and oil tanks are mounted in back of this fire dash. Any suitable size cans may be used here.

There is a frame member of 1″ by ⅛″ strap iron about 15 inches from the second board, shaped in U form, the same as the top of the boards. On this at the top center is bolted a piece of spring steel which is bent to the form of a Y This acts as the top bearing for the steering column. The steering wheel can be raised up out of the bottom of the Y, to enable the driver to get in and out easily.

Between the fire dash and the steel frame directly behind, are five pieces of ¾″ by ¼″ steel, evenly spaced around it, to form a solid foundation for the tin covering. The tail is made of a frame work of wood, and the entire body is covered over with heavy tin.

The exhaust pipe can be put on or left off. Mine is made of a drain pipe 3″ in diameter.

The seat is made of wood and padded. Around the tin edges of the driver's cockpit, shellac thin rubber tubing, to prevent cuts when coming in contact with the sharp edges of the tin. This also gives a finished looking appearance to the job. Now just a coat of paint and your brain-child is finished.

The foregoing plans are offered largely by way of suggestion, so you are at complete liberty to alter them to suit your convenience. Should there be any details which in your opinion need more specific and detailed explanation, Mr. Schilcher will be glad to go further into the matter with you. If such an occasion arises, don't forget to enclose a stamped, self-addressed envelope with your inquiry.

Building a Pair of "Puddle Ducks"

(Continued from page 143)

The idea of walking on water is one of the oldest dreams of man. Early inventors suffered bitter defeat because they used excessive weights and constructed "gunboats" which were too cumbersome to manipulate.

Starting in the calm, not over deep, backwaters, the beginner will quickly acquire the technique of water-skiing. Soon he will feel safe as he travels in mid-stream of a deep river, and a little later will enjoy the rare thrills of taking a rushing rapid. Later still, he may hitch his skis to a speedy motor boat and have his every nerve tingle as he is excited by "water-skijorking."

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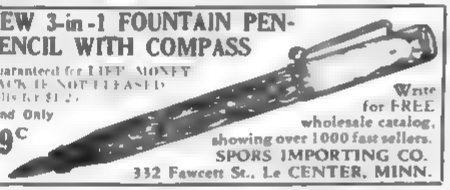

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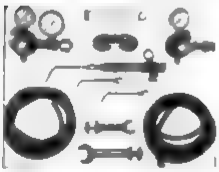

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Travel in a Home on Wheels

(Continued from page 128)

stretched between two 2"x2" pieces. The stretching is accomplished by means of a pair of channel irons and turnbuckles in connection with the "eyes" to which the front seats are fastened, when they are in their normal position. See Fig. 4.

The cabinet is probably the most interesting feature of all. Its dimensions depend on the size of the pieces of equipment carried. Equipment should be assembled and measured before the dimensions are finally decided upon. The cabinet is built mostly of one-half-inch yellow pine, the back and front being exceptions. In the interest of lightness, they are made of plywood.

A careful study of the photos at this point will assist the reader in understanding the explanation. The front of the cabinet is hinged, not at the bottom but up a short distance. Several desirable results were accomplished by placing the hinges in this location. First, the cover when opened is at exactly the right height above ground to be useful as a table. Second, the cabinet as a whole is low. It rests almost directly on the bumpers. In this position it rides well. It does not obstruct the view through the rear window but still its top can be seen with a backward glance.

The cabinet is provided with a false bottom just on a level with the table. Between the false bottom and the true bottom, a space is left which is just high enough to accommodate a two-burner gasoline stove after its legs have been shortened. The stove rests on a board which slides, drawer fashion, into this space. With the stove closed this drawer arrangement slides in at the side of the cabinet, as shown clearly in one of the photos. A hinged door swings shut and closes the opening and this part is ready for traveling.

When in use the stove is left in place on its support. In this position, the stove is very conveniently located with reference to the table. At the opposite side of the cabinet, a similar drawer arrangement is used to support a small washbasin, box with soap, shaving paraphernalia, etc Standing back of the car and looking at the cabinet, its contents may be seen arranged as follows:

At the left on the lower shelf or false bottom is a two-gallon water pail which just fits into its compartment and is convenient to the washbasin. It is large enough so that one trip for water more than suffices for a meal and the dishwashing which follows. Next is a refrigerator, purchased ready-made from an auto supply store. At the right is a square dishpan, which holds all the other pans and utensils when on the road.

The compartment in the center of the cabinet holds nine rectangular tin cans of one size with covers, which contain such staple foods as sugar, coffee, rice, etc. There is plenty of room for canned goods in the remainder of this compartment and above it. The compartment at the upper right contains a one-quart vacuum food jar (not visible in the picture) which is very useful. Milk bottles are also carried here safely. The drawer for spoons, knives and forks (and the can opener!) is just to the left of the milk bottle compartment.

In the upper left corner is what we will call

an electric-fireless cooker. It is a box with hinged cover which is made up like a fireless cooker but also includes a small heating element which operates from the storage battery of the car, or its generator when the car is in motion. The cooker is equipped with runners so that it may also be pulled out after the manner of a drawer.

Since some readers may wish to make this cooker without relation to the cabinet it is described in detail. The box is made of wood to the dimensions given in the drawing. The food to be cooked is placed in an ordinary half gallon syrup pail with friction lid. A small metal tube about one-half inch long is placed through the lid and soldered in place. This permits the escape of steam and hinders the escape of liquid due to shaking when on the road.

The cooker has an inside metal container into which the one-half gallon syrup pail is dropped when cooking. The inside container is made from an old metal "cracker-jack" pail which happened to be just the right diameter. It was a little too tall and so its upper end was removed by shoving over a stick held in a vise and cutting it off smoothly with a hack saw as the can was slowly rotated. The inner container is held in position within the box by a wooden "sub-cover" which has a hole cut in it just large enough to receive the upper end of the inside metal container.

The container is fastened in the "sub-cover" with small nails and the "sub-cover" is then pushed down inside of the wooden box about one-fourth inch and secured with screws. Prior to this operation the inner container must be lined, inside and out, with asbestos. This is easily done with paste such as is used by a paper hanger. Space between the inside metal container and the outside wooden box is filled with wadded paper, put in by turning the arrangement upside down and stuffing the paper in through the bottom, which was nailed only temporarily at first.

A piece of wall board fits loosely in the space between the "sub-cover" and the hinged cover. The heating element is a part of what once served in an electric iron. It is a flat nichrome strip wound on mica. One large square piece and four narrow pieces are required as shown. The material is easily cut with a hacksaw.

The pieces when assembled are held together by four split rivets, placed through holes previously drilled. The length of nichrome wire determines the amount of current and consequently the heating. Shortening the wire will increase the current and the heating. The resistance element should be shortened until the ammeter on the dash of the car reads about seven or eight amperes. The heat given off under this hookup is about fifty watts.

This cooker is not intended to do fast cooking, but is rather more on the order of a true fireless cooker, with which the food must first be brought to a boil before being placed in the cooker. However, food placed in it in the morning will be deliciously cooked at noon.

The car's rear bumpers support the cabinet. Two especially designed detachable brackets, one on each bumper, are used. The brackets are secured to the bumpers with two bolts in each—the

(Continued on page 170)

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32x4	2.95	1.15	29x4.75	2.45	1.20
33x4	2.95	1.15	31x4.95	2.90	1.35
34x4	3.50	1.25	32x4.95	2.90	1.35
31x4½	3.20	1.45	33x5.00	2.95	1.35
32x4½	3.20	1.45	34x5.00	2.95	1.35
33x4½	3.20	1.45	30x5.25	2.95	1.35
34x4½	3.45	1.45	31x5.25	3.10	1.35
35x5	3.60	1.75	32x5.25	3.10	1.35
33x5	3.60	1.75	30x6.00	3.20	1.40
34x5	4.45	1.75	32x6.00	3.20	1.40
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Travel in a Home on Wheels

(Continued from page 169)

same that are used to hold the bumpers to their supports. The cabinet is in turn bolted to the brackets. A one-inch angle iron is screwed to the lower edge of the cabinet. This angle iron provides a suitable means of securing the cabinet to the brackets and at the same time acts as a car bumper, giving adequate protection in the case of minor accidents.

Original plans called for a brace between the upper rear of the cabinet and the back of the car, shaped so that the holes left when the spare wheel carrier was changed to the side of the car, could be used. It was finally decided that the appearance of the car would not suffer noticeably if two small holes were drilled in the back of the car body. These were drilled so that the upper rear corners of the cabinet could be secured to the car body with small bolts. Nipples were used as spacers, the cabinet being so placed that about one-half inch was left between it and the car body.

With this mounting the cabinet rides perfectly —never rattling or loosening. A dust and water proof cover drops down over the cabinet when traveling. Auto top curtain fasteners are used along the lower edge to hold it in place. The cover resembles a rectangular sack, but it is provided with lapping edges. The slits are at the rear corners of the cabinet. It is unnecessary to completely remove the cover when opening the cabinet. It is simply pushed or lifted up so as to permit the "table" to be opened and rests on the top of the cabinet during meal times.

Surprisingly little dust gets into the cabinet when it is closed—never enough to be disagreeable. There is a strip around the inside of the cabinet to prevent the entrance of dust when the cover is closed. This strip is cut in two places and a screw put through one end of the loose piece so that this section becomes a bracket for an electric light (six-volt which operates from main storage battery) which may be swung out over the table.

Emergency gas and oil, tools, chains, folding tent poles, etc., are carried in a long tool box on the left running board. The box is not high enough so that it will interfere with the opening of the door. It is very convenient to be able to use both doors. Fishing rods, camera, binoculars, flashlamp, fire extinguisher and other oft-used articles all have their individual clamps or pockets within the car and are ready for instant use. Good taste dictates the use of china ware instead of aluminum or enamelware. With the compact cabinet, breakage is nil.

When on the road things work out very nicely. At night the suitcases, folding chairs and other extra pieces are placed on the front of the car between hood and fender. All are covered with a 6'x8' piece of canvas, tied down to wheels and bumper at edges and corners.

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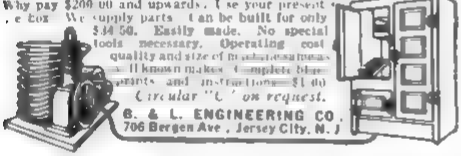

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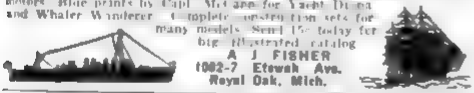

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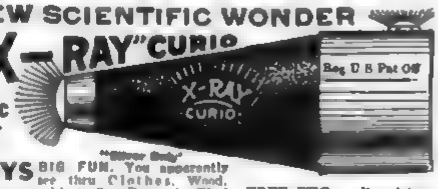

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Lawn Furniture Built in Workshop

(Continued from page 149)

the stringers into its ends. Then attach the arms to the legs and back cleat. Cut the arm brackets and screw them to the arms and legs. Then cut the center seat board and fasten it in place.

The settee requires little description, since its parts are similar to those of the chair and its assembly is identical. Notice by the front elevation that the seat apron is cut away at its center to make a lap joint with the center leg. Notice that there is a center stringer joined to the center leg with a lap joint in the same manner that the end stringers are joined to the end legs.

The center board of the back is 2 inches higher than the wide board each side of it. A pattern for its top is given in the detail drawings. If this settee is longer than you want, omit the center third of the design.

The table shown in the photograph has been built 32 inches high. You may prefer a lower top. The plan of the octagonal top suggests how to lay out a pattern, describing a circle with a radius of 13 inches on which to locate the corners. Place the top boards close together and lay out the octagonal assembly. Nail the rim strips end to end, and to the top boards. Then cut the cleats and screw them to the top boards, spacing the center pair so that the pedestal post will fit between them. With the rim strips and cleats in place, trim off the top boards flush with the rim.

Make the pedestal post of a strip ⅞-inch thick and 1⅝ inches wide, with a strip ¾ inch by ⅞ inch nailed to the center of each face. This will give the post a cross-shaped section, as you will see by the plan and elevation. The post should measure 28¼ inches long for a table 32 inches high.

Lay out the top brackets by the given pattern. Cut two of them, and screw them to the post and to the inner edge of the top cleats. Lay out the four pedestal leg brackets by the pattern given in the detail drawing. Rabbet the inner end of each bracket as shown, to make a lap joint with the post. In assembling, screw the brackets to the sides of the post in the manner shown in the photograph and elevation detail. If the brackets are cut alike, the table should stand without rocking.

Before applying paint, rub down all surfaces, set nail heads, and putty holes, joints and defects. Then apply a coat of shellac to fill the wood and make a hard surface for the paint. Two coats of paint will be sufficient for the job.

Steam to Power Tomorrow's Planes

(Continued from page 113)

manner, operates the ailerons. The exhaust steam from these cylinders, like the engines, is led to the condenser which is just under the skin of the leading edge of the wing.

The landing gear will be so arranged that the stresses are spread over the full length of the fuselage or center section instead of being concentrated at a single point, enabling the designer to use much lighter materials than is possible in the present type of gear. The first step in this direction is being taken by Junkers in his latest development the G38. Steam cylinders will be used to draw the landing gear up into the wing

cutting the drag to a minimum. Unlike the present retractable landing gear, it will be only necessary to give a small faucet-like valve a quarter turn and the wheels drop down into landing position with a steam cushioned shock absorber behind them.

The exhaust steam from engines and cylinders will be condensed and returned to its original state through the process of cooling effected by series of tubes which form the leading edge of the entire wing. This device not only serves as a condenser preventing the loss of water but acts as a heater to prevent the formation of ice on the leading edge of the wing, also warms the air which is conducted along the air ducts in the girders of the wing spars which furnishes heat and ventilation for the cabins.

The propeller and engine may be combined as a single unit as shown in the illustration. The engine utilizing the hub as a crankshaft which is fixed similar to that of the old Gnome rotary, with the engine revolving about the crank shaft opening and closing intake and exhaust ports which form the valve mechanism to drive the pistons operating in the shanks of the propeller blades which would carry off sufficient heat to prevent the formation of ice on the propeller.

The generation of electricity will doubtless be accomplished by direct drive turbine generator set which like the other steam devices will exhaust directly into the condenser on the leading edge of the wing. The current derived from this source will be utilized in furnishing light and energy for the two way radio service and to drive the oil burner used in conjunction with the flash boiler, also in operating the Sperry mechanical pilot which takes charge of the ship after the pilot takes it into the air and sets it on its course. The pilot is then free to navigate his ship without that of keeping it on an even keel. The navigating instruments will be similar to our present day direction finders but instead of having just one loop aerial it will have two mounted on a pedestal beneath the chart table with movable pivots and having a pointer connected to each loop aerial by means of flexible shafts.

The Burnelli transport plane comes nearer being of the flying wing type (which, of course, is the type of tomorrow) than any other transport although Ford engineers are at present using the wing as cargo space. But when the wing is made thick enough for passengers to stand erect in, as it must be for very large transports, a fuselage is no longer necessary and will be replaced by booms extending aft to support the tail groups as is the present practice with Burnelli and Sikorsky.

The primary structure will doubtless be similar to that used in the Akron and her sister ship the Macon except instead of angular dural section it will be welded steel tubing which forms the girders extending from wing tip to wing tip. These same tubes will be used as steam lines to conduct the steam from power plant to engines, likewise to control cylinders, and to act as return tubes to the condenser. Less strength will be needed in the individual members than in present design due to the distribution of load throughout the entire length of the wing.

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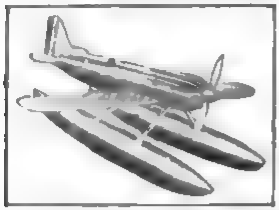

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Talk Over Air With Radiophone

(Continued from page 137)

With either arrangement using feeders, spread the latter out to a distance of at least 18 in. at the far end to take care of leakage losses occurring in feeders at these high frequencies. If the feeders need tuning use a 3 to 5 plate variable condenser across the feeders near the coupling turn as indicated in Figs. 3 and 4.

With the antenna feeders attached to the coupling turn, raise the latter at right angles. Insert the milliammeter in the B plus oscillator circuit and turn on the filaments of that portion.

Press the key and watch milliammeter needle. At its dip in the scale bring the coupling coil down about 2 inches above the oscillating turn. This should raise the meter reading somewhat if the antenna is cut near the frequency the oscillations occur.

If the feeder tuning condenser is operated this upward reading should increase until it starts to dip again. At this peak the antenna is in tune with the oscillator. Do not couple the coils too close. Experience will show this best distance for good coupling.

To determine the limits of the five meter band may prove difficult. The best way of course is to find someone with a five meter receiver to work with you. He tunes his receiver to the band limits and monitors your transmitter from a distance of a few hundred yards. When this is done mark your dial readings.

Another way, if you have a monitor, is to tune the transmitter to a harmonic that will coincide with the frequency you wish to tune your transmitter to. Some local amateur can undoubtedly assist you in finding the proper place on the band.

When the oscillator is properly tuned and the antenna in resonance with it, then turn on the filaments of the modulator tubes and the microphone circuit. Talking in the mike will modulate the output of the oscillators and the voice will be heard distinctly, even over a twenty meter receiver hetrodyned with the carrier of the five meter job.

To prove oscillation, use a single turn of wire about three inches in diameter connected to a flashlight bulb (See Fig. 4). The coil and bulb should be brought down to within a couple of inches of the oscillating turn. If oscillation is taking place the bulb will glow.

The photographs show the rotors of the variable tuning condenser containing more plates than can be used for five meter work. After the transmitter was used and oscillation proved, one plate at a time was removed from each rotor until finally three plates were left in each. This caused the set to oscillate in the five meter band.

The stator plates unmeshed with the rotor plates have no capacity with them and therefore need not be removed. Your particular make of condenser may call for more or less rotors to be left in and therefore makes the mention of a definite number in this article somewhat uncertain.

Nothing is guaranteed in this article. It merely shows what has been done by the writer at frequencies from 56,000 to 60,000 kilocycles and gives the reader a new field to work in at which his

Talk Over Air With Radiophone

ingenuity may have full sway and thus possibly give the radio field new ideas and facts.

The peculiarities of five meter transmission are many but will prove interesting. Hills, high buildings, woods, etc., will often prove barriers to such signals at certain periods of the day and prove ineffective at others. On account of the small antenna dimensions beam transmission can be tried by means of reflectors.

By tuning each of two transmitters to opposite ends of the five meter band two way conversation or "duplex" can be carried on. This means that each transmitter can be kept on the air and thus questions and answers passed exactly as on a land telephone.

Five meter transmission has plenty of possibilities. A five meter receiver for use in conjunction with this transmitter will be described in the next issue of Modern Mechanics and Inventions

Before you go on the air with this low wave transmitter you will have to get a station and operator's license from the government. However, that's a simple procedure and it costs nothing. The chief difficulty comes in learning the code and some of the fundamentals of radio.

Precisely how to proceed in getting your license, in learning the code, and in acquiring some knowledge of the technical side of radio, as well as how to construct and operate a very efficient radio station, can be learned from a little booklet available from Modern Mechanics and Inventions Radio Editor, 529 So. 7th St., Minneapolis, Minn.

The booklet, entitled "How to Become a Radio Amateur," will be forwarded to you upon receipt of 25 cents at the above address. It's written in plain language so that any beginner can master the fundamentals of radio in a short time and obtain a government license without undue difficulty.

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to your particular taste

Serve Root Beer, Ginger Ale, etc., at one-half cent a glass. Carbonated water (club soda) five cents for five gallons. Quickly made. No bottling worries! Always on draught.

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Send me a simple sketch of a model for CONFIDENTIAL ADVICE—DO IT NOW!

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Please send me full information and literature about Patent Protection without obligation.
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PATENTS

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WRITE for free information, HOW TO OBTAIN A PATENT and RECORD OF INVENTION—or send drawing or model of your invention for examination.

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EVERYONE BUYS when they see amazing results in using Peerless Cement in repairing broken dishes furniture radios auto parts EVERYTHING! 1,000 uses repairing leather, wood china glass metal Waterproof heatproof coldproof acidproof

AGENTS MAKE CLEAN UP

YOUR big chance you should make $500 to $1,000 daily selling Peerless Cement to every home office shop garage factory etc. Sold in bottles in 1 1/2 hours a man in town with auto can work full or spare time. Send for Special Introductory Offer.

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YOUR MONEY BACK if unable to sell. Low price offers 100 per cent clear profit. Sample shipments prepaid. Full or spare time wonderful side line. Write for exclusive territory. Don't delay. Write today.

SELLS TO STORES ALSO

New Attractive Counter Display will double your sales.

PEERLESS WATERPROOF CEMENT CO.
3940 Dodier St., St. Louis, Mo.

REPAIRS EVERYTHING

Send 25c for a Full Size Trial Bottle—No Free Samples

Fortune Making Ideas for Inventors

(Continued from page 93)

Specifications: Should be made to sell for a dollar, should be able to respond to all frequencies between 100 cycles and 10,000 cycles. Should not have an adjustment that gets out of order.

Exploitation: Should be patented in all of the countries of the world. Should be sold to the manufacturers of radio sets with the idea that several speakers would be supplied with each receiver.

4. Vacuum Walled Electric Refrigerator

If I were going to specialize in any kind of invention at the present time, I think I should cast my lot with the electric refrigerator industry, for here is a rising tide full of promise and practically "dirty" with money.

The idea that we have in mind now, however, is a bit more complicated and will take a lot of money and patience to develop it. What I refer to is the perfect ice box—either electric or ice—that will not leak thermally.

We have only one kind of a perfect thermal insulation and that is the perfect vacuum which, as we all know, is not attainable. However, we can come close to it and we can certainly and very easily reach degrees of exhaustion where the amount that would be conducted would be a percentage so small as not to be worth considering.

All of which calls for an ice box with a vacuum between the walls. A nice order when one thinks of the terrible atmospheric pressure of 14 pounds to the square inch. However, we have light strong steel, we can make light strong braces from the aluminum alloys, and we have perfected welding to a point where metal may be handled as easily as glass. Why not the vacuum walled electric refrigerator?

Specifications: Should be made to sell at a slightly increased price, for when it is known that these ice boxes will cut the electric bills practically in half, people will be willing and even anxious to pay more. Construction should be simple.

Exploitation: Although the electric refrigerator is still an American luxury it will not be long before it will invade Europe and for that reason the inventor of this device should see to it that his invention is patented in all of the leading countries of the world.

5. Non-Sticking Radiator Valve

This sounds so simple that one would not be inclined to think it was a problem, and if one decided to solve it one might make the mistake of thinking that it could be tossed off some night after dinner.

Who would think that a sticking steam radiator valve would be a major problem of heating, and yet I know of two men who have spent many years trying to perfect this item.

The present valve, after some use, will stick and plug up due to metal deterioration, dirt and what not. For the benefit of those fellows who seem to think that all of these ideas can be solved on paper, I would advise everyone to make a model of his idea before he is too sure that he has the proper solution.

Specifications: Must not cost any more than the

(Continued on last page)

Hotter than Coal
and no dirt

A New Invention

Do away *forever* with the drudgery of wood and coal. The most simple and economical invention on the market is now giving perfect satisfaction to enthusiastic users everywhere. This new invention is a new type of oil burner that takes the place of wood or coal and automatically and silently changes cheap oil into one of the quickest and hottest fires known.

Burns 96% Air and 4% Cheap Oil

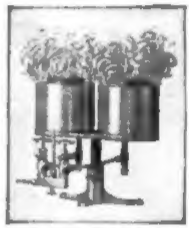
The International Oil Burner fits in the fire box of your present range, stove, or furnace. It can be installed in a few minutes by anyone. No holes to be bored, no damage to your heating plant. There is nothing complicated about the International Oil Burner. It gives you all the heat you want—when you want it. Starts instantly with a match. No soot, smoke, or odor. Costs less than coal.

Costs Only a Few Dollars

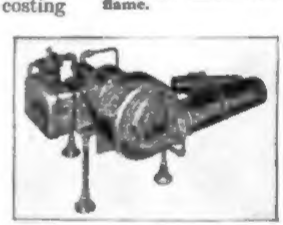
International Oil Burners heat just as well as burners costing $400 or $500. Simply turn 1 valve and you have all the heat you want. Cleaner and better for heating or cooking. Approved by the National Underwriters' Laboratories and engineers everywhere. Over 150,000 have been sold.

30 Days' TRIAL Offer

Try this wonderful automatic oil burner right in your own home at our risk. Act quickly and get our special low introductory price. Sold under absolute money-back guarantee. Write at once for **free** booklet on home heating and our **free** burner offer.



Double Blue Flame Burner for cook stoves, ranges, and parlor circulators. Burns with beautiful clean blue flame.



All-Electric Power Burner designed for larger houses, apartments, etc.

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☐ Check if interested in making money as an International representative with protected territory.

Tuna Fishing Boats Make Fortunes

(Continued from page 95)

full value, recruits his crew and hopes for the best.

The boats are owned in different ways. Sometimes an individual owner, sometimes partnerships of two or three or four, and occasionally a company in which all fishermen on the boat own an interest.

These boats fish exclusively for tuna. From July to November they find the schools from 350 to 600 miles south of San Diego in the Pacific, and from December to June they go from 600 to 1500 miles south.

The larger boats must take 100 tons at $120 a ton to make large profits. An average load grosses about $8,000. When expenses and the boat's share are deducted and the balance distributed to the crew of 10 to 14, the balance gives an excellent wage to crew members. Meantime the owner is rapidly accumulating a fortune to pay for the boat.

The method of fishing is simple though tedious. In the old days tuna fishermen attempted to use nets but many of them lost their nets when large loads of fish carried them to the bottom. This may sound strange but the tuna have no wind bag and sink to the bottom when dead. In a net the tuna kill themselves by thrashing about and soon the weight carries not only the net but the live fish to the bottom.

When a boat strikes a school—but let Joe Medina explain it:

"We stop the boat. The chummer, who handles the bait, sitting on a tank throws over sardines and anchovies and as soon as they hit the water they dash underneath the boat. This draws the school underneath.

"Then the fishermen go after them with flies or artificial squids, barbless hooks an inch in diameter at the bowl, fixed to the end of a 6-foot line which is fast to the end of a 12-foot bamboo pole.

"The boys stand on metal fishing racks and if they are lucky they can throw aboard 30 to 35 tons in a day, although 15 tons is the average.

"As long as the boat stays in the school the fish swarm around the bait taking the squids continuously. Some of the boys who are expert fishermen catch from five to eight fish in a minute. For those weighing up to 25 pounds we use one line for each hook. Between 25 and 50 each hook carries two lines while above 50 three lines are used.

"The skipjack weigh from 5 to 15 pounds, and the yellowtail from 10 to 200. Skipjack are blue fish with gray stripes on their sides. The yellowtail also are blue with a white belly, yellow fins and tail but no stripes."

The total fishing fleet from San Pedro and San Diego carries a value in excess of $6,000,000. On account of immigration restrictions, Japanese are fading from the picture, while the Portuguese and Italians are invading the fleet in larger numbers. So prosperous have they become—with skipjack at $80 a ton and yellowtail at $120—that they have established their own homes, many of them as modern as the finest American homes.

Fortune Making Ideas for Inventors

(Continued from preceding page)

present valves and must never plug for any reason.

Exploitation: Should be patented only in the United States and Canada owing to the absence of central heating plants in Europe.

6. Dime Bank Encourages Thrift

Some of the largest fortunes that inventors have rolled up have been the result of simple little things that may be sold for ten cents or less. I recall the famous dime bank that made many, many thousand dollars for its inventor.

There is a great opportunity for a duplication of this great success in a coin bank made of the cheapest pressed metal that will actually register each time a coin is put in and give the total amount. A simple counting device could be arranged so that coins of various size will operate the counting device and give the total at all times.

Specifications: Self-totaling and made completely of pressed metal. Should be sold for ten cents.

Exploitation: Should be patented in all the large countries of the world.

7. Ice-Proof Preparation for Windshield

In driving in a sleet storm did you ever try rubbing your windshield with a package filled with Bull Durham? The glycerine in the tobacco prevents ice from forming or at least from sticking and it also prevents the rain from forming drops, making it run down in a thin, even sheet which greatly aids vision.

In talking this matter over with a chemist friend of mine recently, he said that it would be perfectly possible to develop a cheap fluid for this purpose that would be better than all of the windshield wipers and windshield heaters ever made. That's a problem for you fellows who like to fuss around with beakers and test tubes.

Specifications: Materials should sell for ten cents a bottle and should have the same refractive index as glass. Should prevent the formation of ice and should also cause rain to run down the glass in thin even sheets, preventing the formation of drops.

Exploitation: Inventor should take out a formula patent in the United States and Canada, the two countries where automobiles are most used.

8. Heat-Proof Coffee Pot Handle

I often laugh when I see the many wonderful inventions about us and then think of the thousands of simple little things that we see every day and that are so hopelessly imperfect.

I take as an example—and an excellent one, too—the ordinary coffee pot handle, both for coffee pots and electric percolators, indeed. These handles get terribly hot and sometimes they burn, to say nothing of the impossibility of picking them up without some protection for the hands.

The question before the house is how this thermal conduction can be arrested effectively. All sorts of heat-proof joints have been proposed and used but the problem is still with us.

Specifications: Should not add much to the cost of manufacture but should keep the temperature of the handle reasonably cool at all times.

Exploitation: Should be patented in all of the principal countries of the world.

Honestly...Why do you want $3,500.00 CASH NOW?—

I WILL PAY $250

For the Winning Answer to this Question

I am going to give $3,500.00 to some deserving man or woman who answers my announcements. *You may be the one to get it!* But, before I give it to anyone I would like to know just *why* you want $3,500.00 cash now. Just answer this question—tell me in a sentence of 20 words or less, and in your own way, why you want $3,500.00 cash now—*nothing more to do toward the $250.00 cash prize!* Sounds easy? It is easy! The first answer that comes to your mind may win the prize. No selling—no soliciting. There are no strings at all to this amazing prize offer of $250.00 cash. ALL persons 16 years of age or older owe it to themselves to enter this contest.

20 SIMPLE WORDS WIN $250.00 FOR SOMEONE, MAYBE YOU!

Nothing More for You to Do!

$250 Prize given just for the winning answer to my question

There is no way you can lose. Simply tell me why you want $3,500.00 cash *now*. The prize for the winning answer is $250.00.

The mere fact of sending in a few words for this big $250 cash prize qualifies you for the greater opportunity to

WIN $3,500 CASH

Or a Studebaker-8 Sedan and $2,000 Cash

This huge prize is **extra and separate** from the cash prize offered for the best answer to my question in only 20 words or less. No wonder we say that here's your opportunity to win a fortune. Just imagine! $3,500.00 cash besides . . . all coming to you at once. Think! Why do you want $3,500.00 cash **now?** Do you want it to start a business of your own, pay off a mortgage on your home, buy new furniture or clothes? Maybe you want it to help you get an education. Consider all the things you could do with such a huge sum. Plan now—then write your answer—rush it to me at once. Yours may easily be the winner. All replies become the property of Richard Day, Manager.

BE PROMPT! I Will Send You a $100.00 Cash Certificate AT ONCE!

To make it worth your while to be prompt in sending in your answer to my question, "Honestly . . . why do you want $3,500.00 **cash now?**"—if you will see that your letter is postmarked not more than three days after you read this offer **I will send you a Cash Promptness Certificate entitling you to an extra $100.00 in cash** should your reply, in the opinion of the judges, win the $250.00 cash prize offered above, making a cash prize of $350.00 in all.

Hundreds have won

Throughout the past year we have given financial help to hundreds of deserving people in all parts of the United States . . . we have given away hundreds and thousands of dollars in prizes. Beemer won $4,700, Harriet Robertson won $1,100. Hundreds more made happy with huge prizes and cash awards. Now is YOUR opportunity—ACT TODAY!

Rules

Only one answer accepted from a family. Use your own name. $250.00 given for best answer to my simple question, "Why do you want $3,500.00 cash now?" Answers must be postmarked not later than November 1, 1932. Judges will consider answer only for practical value of the idea, construction and spelling. Neatness or ingenuity of submitting answer not considered. Duplicate prizes will be given in cases of duplicate winning answers.

RICHARD DAY, Manager
909 Cheapside, Dept. B-53H Cincinnati, Ohio

Just Sending Answer Qualifies You for Opportunity to Win $3,500.00

Some say I am wrong. They say that giving money to people will not help to bring back prosperity. They say that the people who get money from me will spend it foolishly. Now I want to find out. I am going to give away $6,000.00. Someone is going to get $3,500.00, all cash. If I gave you the $3,500.00 how much happiness could you buy with it? Tell me in 20 words or less. Just sending an answer qualifies you for the opportunity to win $3,500.00. If you are prompt I'll send you a $100.00 Cash Certificate AT ONCE! Here is an opportunity of a lifetime. Costs you nothing to win. Rush your answer today. Send no money—just tell me how much happiness you could buy with $3,500 right now — if I gave you the $3,500.00 that I have promised to give to some yet unknown deserving person.

Richard Day

Use Coupon or Write Letter with Your Answer

$250.00 PRIZE COUPON

RICHARD DAY, Manager
909 Cheapside, Dept. B-53H, Cincinnati, Ohio
Here's why I want $3,500.00 *now*:
(Write your answer plainly here, in 20 words or less):

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.....

.....

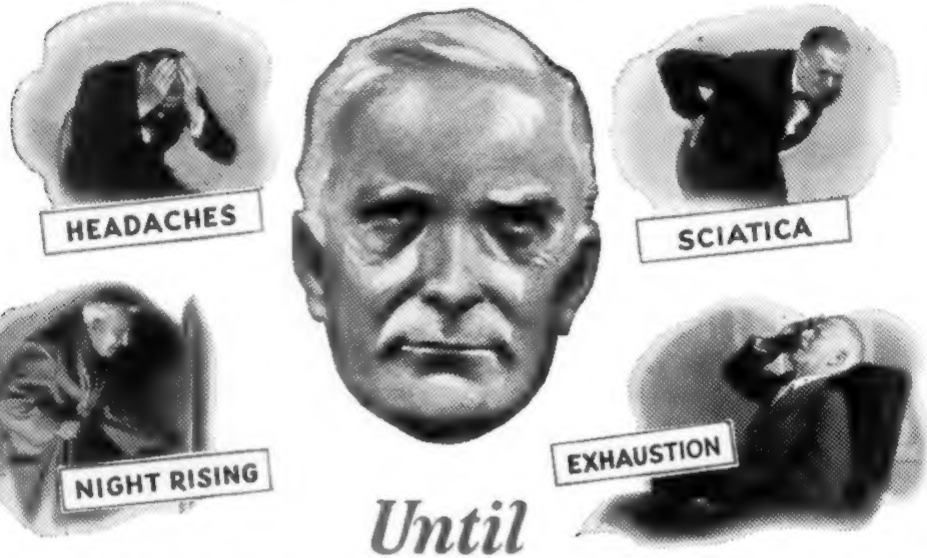
Name .....

Address .....

Town ..... *State* .....

Date I read your offer .....

This Little Gland Robbed Me of Sleep and Health



Until I Discovered a New Hygiene for Men Past 40

IT HAD been coming on for years—this devilish thing called "Prostate Trouble!" I gave it little thought at first, because I figured that all men experience a certain change about my time in life. That was my big mistake. I thought it was *just* the break-down of oncoming age and that I would have to put up with it. I did for a while, but a year later, my condition went from bad to worse at an alarming rate.

These Common Symptoms

My sleep was broken a dozen times every night. In fact, one hour's fitful sleep was a luxury. Pains had developed in my back and legs, and I was chronically constipated. I was run down in body and almost broken in mind—practically an invalid at 58. I talked to scores of men. In fact, I talked to practically every man I met or could get to listen. As I look back now I think I was practically insane on the subject.

Faces Surgery

It has been my experience that a majority of men past 60—and a surprising number even at 40—had one of these distressing symptoms, but few men had it as bad as I did. I had seen my doctor, of course. But he could offer me but little relief. I spent hundreds of dollars in an effort to avoid an operation, for I had learned that gland surgery was usually dangerous. This insidious little gland that robbed me of sleep and health now threatened my very life.

The Turning Point

Then I read one of your advertisements. I admit I mailed the coupon without the slightest hope. There probably never was a more skeptical mind than mine. But this simple little set turned out to be the biggest thing in my life.

I can never thank you enough. I am now sixty. I can go to bed at ten o'clock and sleep straight through. My doctor has pronounced me in normal health. My entire body is toned up, and I feel almost like a youngster. I have had no return of the trouble, and now use your pleasant treatment just fifteen minutes a day, over one or two months, just to make sure that I keep my perfect health.

Millions Make This Mistake

When I was at my lowest ebb, I encountered so many prostate sufferers that I know there must be millions of men doctoring for sciatica, pains in the back and legs, bladder and kidney weakness, chronic constipation, loss of physical and mental capacity and a host of supposed old age symptoms, *who should probably be treating the prostate gland!* In fact, I learned not long ago that certain medical authorities claim that 65% of men at or past middle age suffer from disorders of this vital gland.

My advice to these men is, not to make the mistake that I made. Send the coupon for that little book, "Why Many Men Are Old at 40."

Find out the facts about this little gland, which the book contains. It explains a prominent scientist's discovery of a new home hygiene — explains how, without massage, diet, or exercise, this method acts to reduce the congestion and combat the dangerous symptoms.

Scientist's Book Sent Free

See if these facts apply to you. Learn the true meaning of these common complaints and see why these ailments in men past 40 are so often directly traceable to a swollen prostate. The book, "Why Many Men Are Old at 40" is sent without cost and without obligation.

Simply mail the coupon to W. J. Kirk, President, The Electro Thermal Co., 3856 Morris Ave., Steubenville, Ohio.

If you live West of the Rockies, address The Electro Thermal Co., 303 Van Nuys Building, Dept. 38-K, Los Angeles, Calif. In Canada, address The Electro Thermal Co., Desk 38-K, 53 Yonge St., Toronto, Can.

W. J. Kirk, President,
3856 Morris Ave., Steubenville, Ohio.

Please mail me at once your Free booklet, "Why Many Men Are Old at 40," and full details about the new home treatment. I am not obligated in any way.

Name .....

Address .....

City..... State.....